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DEPARTMENT OF THE INTERIOR
U. S. FISH AND WILDLIFE SERVICE

UNITED STATES DEPARTMENT OF THE INTERIOR
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*Robert L. Herbst, Assistant Secretary for Fish and Wildlife and Parks
Fish and Wildlife Service, Lynn A. Greenwalt, Director*



SPORT FISHERY ABSTRACTS

*Roger Schoumacher, Editor
Terry N. Sexson, Assistant Editor*

Editorial Office
U.S. Fish and Wildlife Service
Aylesworth Hall, CSU
Fort Collins, Colorado 80523

Sport Fishery Abstracts is intended to furnish fishery biologists with abstracts of current literature in sport fishery research and management.

One volume, consisting of four numbers, is issued each year. Each number contains separate Author, Geographic, and Taxonomic indexes, and the final number of each volume contains cumulative Author, Geographic, Taxonomic, and Subject indexes, and a list of publications screened. Authors who publish in journals not screened for *Sport Fishery Abstracts*, and who would like their publications included, should submit abstracts to the Editor.

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SPORT FISHERY ABSTRACTS

An abstracting service for fishery research and management

Volume 22 Number 3

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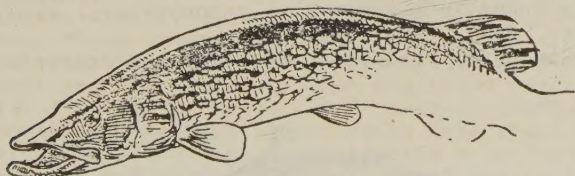
AQUATIC PLANTS AND THEIR CONTROL

77-000802 Berry, C. R., Jr.; Schreck, C. B.; Van Horn, S.; Strange, R. ANGLER ORIENTED OBJECTIVES OF AN AQUATIC WEED CONTROL PROGRAM. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 301-309. 1975[1976]. SFA 22(3)

[Dep. Fish. Wildl. Sci., VPI & SU, Blacksburg, VA 24061] Chickahominy Reservoir, Virginia, was treated with a mixture of herbicides diquat and endothall to control obnoxious growths of *Egeria densa*/ Planchon. Herbicides were undetectable in water by the 16th day after treatment. Herbicides accumulated in plant tissue at levels higher than those in the water. Only diquat accumulated in hydrosols. Diquat levels in hydrosols increased as levels in plants and water decreased. All diquat had dissipated from hydrosols after two years. Neither herbicide concentrated in edible fish flesh. Aerial photographic monitoring revealed the amount of surface acreage and fishable shoreline was increased substantially following treatment. Weed regrowth was greater in shallow areas than in deeper areas after one year. Seventy-two percent of the anglers polled to determine the sportsmen's opinion of the weed control project believed that the treatment alleviated the weed problem and increased fishing and boating enjoyment.

77-000803 Linde, A. F.; Janisch, T.; Smith, D. CATTAIL--THE SIGNIFICANCE OF ITS GROWTH, PHENOLOGY AND CARBOHYDRATE STORAGE TO ITS CONTROL AND MANAGEMENT. Wis. Dep. Nat. Resour. Tech. Bull. No. 94. 27p. 1976. SFA 22(3)

[Wis. Dep. Nat. Resour., Madison] A possible phenological and physiological basis for control has been suggested for use in cattail management work in Wisconsin. Cattail is a very important and natural part of most wetlands. It can provide desirable cover and nesting sites for waterfowl and other wildlife if it is properly interspersed with other plant species and open water. However, because of its ability to spread and dominate other plants, it can under favorable conditions completely close desirable semi-open habitat with solid cover. Control and management methods to be most effective must take into consideration the strengths and weaknesses of the plant under Wisconsin conditions. The low period in carbohydrate reserves is the time when the plant should be most susceptible to injury and the period when control measures should be most effective. Phenological indicators can be used to determine the physiological low when carbohydrate reserves are minimum.



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77-000804 Macan, T. T. CHANGES IN THE VEGETATION OF A MOORLAND FISHPOND IN TWENTY-ONE YEARS. J. Ecol. 65 (1): 95-106. Mar. 1977. SFA 22 (3)

[Freshwater Biol. Assoc., Ferry House, Ambleside, Cumbria, LA22 0LP, England] Hodson's Tarn in north-west England, c. 0.5 ha in extent and 3 m deep at the maximum, lies in rocky moorland used for little except plantations of *Picea* and *Larix*. Observations have been made on fifteen species of macrophytes in the period 1955-76. There has not been a progressive seral change in the vegetation. Details are given of marked fluctuations in the abundance of the three most frequent species: *Myriophyllum alterniflorum*, *Littorella uniflora* and *Carex rostrata*. Other less frequent species have changed position (*Potamogeton natans*), fluctuated in abundance (*Juncus fluitans* and *Nitella flexilis*), disappeared (*Alisma plantago-aquatica* and *Glyceria fluitans*), or invaded and expanded (*Potamogeton alpinus*). It is suggested that these changes are related to the amount of plant remains added to the soil each year and the rate of its decomposition.

GENERAL FISH CULTURE

77-000805 National Oceanic and Atmospheric Administration NOAA AQUACULTURE PLAN. National Oceanic and Atmospheric Administration, Washington, D.C. vi + 41p. May 1977. SFA 22 (3)

[National Oceanic and Atmospheric Administration, Washington, D.C.] Public or private aquaculture of several major species is largely successful. With the solution to some biological, technological, institutional, or marketing problems, production of these species could be increased to help the United States meet the anticipated demand for seafood. Additional species have potential, but research and development are needed to provide an adequate scientific and technical base for development of aquaculture. The expansion of aquaculture will require the coordinated efforts of Federal and State agencies, universities, and private industry. NOAA proposes to take the lead in these efforts.

TROUT AND SALMON CULTURE

77-000806 Billard, R. A NEW TECHNIQUE OF ARTIFICIAL INSEMINATION FOR SALMONIDS USING A SPERM DILUENT. Fisheries (Bull. Am. Fish. Soc.) 2 (1): 24-25. Jan.-Feb. 1977. SFA 22 (3)

[Lab. Physiol. Poisons, I.N.R.A., 78350 Jouy en Josas, France]

77-000807 Boydston, I. B.; Hopelain, J. S. CAGE REARING OF STEELHEAD RAINBOW TROUT IN A FRESHWATER IMPOUNDMENT. Prog. Fish-Cult. 39 (2): 70-75. Apr. 1977. SFA 22 (3)

[Calif. Dep. Fish Game, Anadromous Fish. Br., Sacramento 95816]



SPORT FISHERY ABSTRACTS

77-000808 Fyock, O. L. NITRIFICATION EQUIPMENTS OF WATER RE-USE SYSTEMS FOR RAINBOW TROUT. Colo. Div. Wildl. Spec. Rep. no. 41. 31p. Feb. 1977. Available at \$1.00 from Colo. Div. Wildl., Denver. SFA 22(3)

[Colo. Div. Wildl., Denver] A study was conducted with a trickling filter to determine the specific nitrification area (at 16 °C and pH 8.2), quantity of ammonia and time required for chemical activation, and effects of therapeutic chemicals on a 90-percent water re-use system. The filter maintained 0.5 g of chemically introduced ammonia/sq m of surface-¹/day-¹ but only 0.3 g of naturally introduced ammonia. The ammonia was introduced chemically as ammonium chloride and naturally by rainbow trout, *Salmo gairdneri*. Tolerance levels of ammonia (0.55 mg NH₄⁺ + NH₃/l) and nitrite (0.2 mg NO₂⁻/l) were not exceeded in the raceway by the ammonia produced from 0.94 kg of 20-cm or 1.34 kg of 35-cm trout/sq m of surface-¹/day⁰¹. The quantity of feed fed to the fish and safely maintained by the system was 0.009 kg/sq m of surface-¹/day-¹. Size of fish made no difference in this quantity. Chemical activation was successfully achieved in 21 days by the addition of 0.5 g ammonia (as ammonium chloride)/sq m of surface-¹/day-¹. The system was considered stable when ammonia in the raceway dropped below 0.55 mg NH₄⁺ + NH₃/l and nitrite below 0.2 mg NO₂⁻/l. Hyamine-3500 at 1.0 mg/l did not adversely affect nitrification or cause fish mortality. Malachite green at 3.0 mg/l had no effect upon nitrification; however, fish mortality was 100 percent. Fish mortality did not occur when 0.25 mg malachite green/l was tested.

77-000809 Goetz, F. W., Jr. THE /IN VITRO/ INDUCTION OF FINAL MATURATION AND OVULATION IN BROOK TROUT (*SALVELINUS FONTINALIS*/) AND YELLOW PERCH (*PERCA FLAVESCENS*/) OVA AND THE HORMONAL CONTROL OF FINAL MATURATION IN OVA OF OTHER FISH SPECIES. Ph. D. dissertation, Univ. Wyo. 112p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(11), 1977. SFA 22(3)

77-000810 Leitritz, F.; Lewis, R. C. TROUT AND SALMON CULTURE (HATCHERY METHODS). Calif. Dep. Fish Game Fish Bull. 164. 197 p. 1976. SFA 22(3)

This is an updated version of Bulletin 107, now out of print, published in 1953, which has been a "bible" to many hatchery personnel.--RS

77-000811 Reagan, R. W., Jr.; Pohinetta, H. P. CULTURE OF RAINBOW TROUT IN COMBINATION WITH OVER-WINTERING CHANNEL CATFISH IN MISSISSIPPI. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 99-101. 1975/1976. SFA 22(3)

[Dep. Wildl. Fish., Miss. Agric. Forest. Exp. Stn., Miss. State Univ., Mississippi State 39762] The feasibility of raising rainbow trout with over-wintering channel catfish in 0.04 ha (0.1 acre) ponds was examined. Three treatments with three replications were used: (1) 200 rainbow trout fed three percent of fish weight per day, (2) 100 rainbow trout and 75 channel catfish fed three percent of trout weight per day, (3) 100 rainbow trout and 75 channel catfish not fed. Trout grown alone showed slightly higher gains than those grown with catfish and receiving feed, and were statistically significant (P less than .05). Both trout and catfish not fed showed statistically significantly less gain than those receiving feed and the trout significantly lower survival than trout receiving feed. Catfish receiving feed showed a mean gain of 117 g. Trout receiving feed demonstrated a mean gain of 217 g in the 131 days of the study.

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77-000812 Pefstie, T.; Steine, T. A.; Gjedrem, T. SELECTION EXPERIMENTS WITH SALMON. II. PROPORTION OF ATLANTIC SALMON SMOLTIFYING AT 1 YEAR OF AGE. *Aquaculture* 10 (3): 231-242. Mar. 1977. SFA 22(3)
[Dep. Anim. Genet. Breeding, Agric. Univ. Norway, AS-NLF, As Norway]
Salmon (*Salmo salar*/) brood stock were taken from 37 localities in Norway for 4 consecutive years. Each year, after fertilization, the offspring in each family from each strain were reared in separate egg trays and fingerling tanks. The percentage of fish in each tank which smoltified at 1 year old was recorded, and environmental and genetic factors influencing the percentage smoltification were studied. Percentage smoltification was significantly affected by the number of fish held in a tank, or fish density (correlation coefficient 0.03-0.27). Variation between locality of origin of brood stock and percent smoltification was highly significant for each year class, and there was a high correlation (0.89-0.95) between smolt percentage and average weight of fish in a family. Heritabilities in percent smoltification estimated by sire component from total data had a weighted average of 0.06 (range 0.16 to -0.01). From the dam component heritabilities ranged from 0.20 to 0.40 when tank effect was ignored, and 0.08-0.25 with tank effect taken into account. Variance components for locality were two to three times as high as those for sires within localities, indicating that genetic variation is greater between than within localities. Highly significant interaction sire x dam was found, suggesting a considerable nonadditive genetic variance influencing the percentage of fish smoltifying at 1 year of age.

77-000813 Weithman, A. S.; Anderson, P. O. EVALUATION OF FLOTATION SOLUTIONS FOR SORTING TROUT EGGS. *Prog. Fish-Cult.* 39 (2): 76-78. Apr. 1977. SFA 22(3)
[Mo. Coop. Fish. Res. Unit, Univ. Mo., Columbia 652011]

OTHER ANADROMOUS SPECIES CULTURE

77-000814 Bonn, F. W. GUIDELINES FOR STRIPED BASS CULTURE. South. Div., Am. Fish Soc. 125p. 1976. Available at \$5.00 from E. W. Bonn, 1300 W. Munson, Denison, TX 75020. SFA 22(3)

WARMWATER CULTURE

77-000815 Adams, J. C.; Kilambi, P. V.; Wickizer, W. A.; Brown, A. V. MACROBENTHOS POPULATION CHANGES IN CRYSTAL LAKE, ARKANSAS, SUBSEQUENT TO CAGE CULTURE OF FISH. *Proc. Ark. Acad. Sci.* 30: 12-13. 1976. SFA 22(3)

[Dep. Zool., Univ. Ark., Fayetteville 727011] A three-year study was conducted to determine the possible effects of cage culture of fish on the environment of Crystal Lake, Arkansas. The investigation consisted of three periods: pre- (November 1971-October 1972), during- (November 1972-October 1973), and post- (November 1973-October 1974) cage culture. Numbers and biomass of benthos per square meter for pre-, during-, and post-culture periods were 1353 (10.0g), 730 (8.8g), and 1028 (4.1g), respectively. Numerically, *Chaoborus* sp., Chironomidae, and *Oligochaeta* comprised more than 97 percent. *Chaoborus* was the most numerous organism before fish culture (greater than 68 percent), but dominance shifted to the *Oligochaeta* (greater than 58 percent) after culture.

77-000816 Aliyev, D. S. THE ROLE OF PHYTOPHAGOUS FISHES IN THE RECONSTRUCTION OF COMMERCIAL FISH FAUNA AND THE BIOLOGICAL IMPROVEMENT OF WATER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 216-229. 1976. SFA 22(3)

[Inst. Zool., Turkmenian Acad. Sci., Ashkhabad, USSR]

77-000817 Foyd, C. E. WATER QUALITY IN CATFISH PONDS. J. Mar. Sci. 2 (3): 19-30. 1974. SFA 22(3)

[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830]

77-000818 Chen, T. H. CAGE CULTURE OF CHANNEL CATFISH IN A HEATED EFFLUENT FROM A POWER PLANT, THOMAS HILL RESERVOIR. Ph.D. dissertation, Univ. Mo. (Columbia). 98 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

At Thomas Hill Reservoir channel catfish were cultured in floating cages within an 88-acre arm that received heated water from a 475,000 kw power plant at a rate of 250,000 gal per min. Control fish were cultured in another arm subject to annual temperature regimes. Laboratory experiments in fall and spring indicated that 30C was the optimum temperature for growth. Food conversion factors for these times were 1.6 and 1.3 respectively. Growth of catfish appeared not to be affected by photoperiod. Between June 30 and August 13, 200 fish in each of four cages were cultured in heated water, and 200 fish as controls. The best growth (236.6 percent increment) was obtained in the cage with a mean temperature of 32.7 C. When growth of all fish in the heated water was compared to the controls, the controls exceeded them by 1.9 g. Average temperature at the cage near the discharge exceeded the optimum temperature for growth by 4.5 C. Mortality was not noticed. Two hundred caged fish were maintained in the heated water for 2 years. Minimum growth was 861.4 g, maximum growth was 2265.7 g, and the mean was 872.7 g. Survival was 95 percent. Between October 30 and July 25, 200 fish in each of the three cages were cultured in heated water, and 200 fish in the control area. There was a significant difference in growth between fish in the heated water and the controls. Over-winter mortality was low, only 1.5 percent in one cage in heated water and 1.5 percent in the controls. Within the heated water fish were stocked over winter (October 1 to July 1) at densities of 50, 100, and 200 per cubic yard. There appeared to be no apparent correlation between stocking densities and growth; further, there was no apparent relationship between survival and stocking densities. The economic feasibility of the cage culture of channel catfish is discussed.--From abstr.

77-000819 Kilambi, R. V.; Adams, J. C.; Brown, A. V.; Wickizer, W. A. EFFECTS OF STOCKING DENSITY AND CAGE SIZE ON GROWTH, FEED CONVERSION, AND PRODUCTION OF RAINBOW TROUT AND CHANNEL CATFISH. Prog. Fish-Cult. 39 (2): 62-66. Apr. 1977. SFA 22(3)

[Dep. Zool., Univ. Ark., Fayetteville 72701]

77-000820 Krishnamoorthi, K. P.; Abdolappa, M. K.; Jaganath Rao, A. V. PRODUCTIVITY OF /CLARIAS BATRACHUS/ IN THE SEWAGE FERTILIZED FISH PONDS. Indian J. Environ. Health 18 (4): 292-298. Oct. 1976. SFA 22(3)

[Natl. Environ. Eng. Res. Inst., Nagpur-440020, India] Two experimental ponds receiving effluent from the waste stabilization pond and a control pond of fresh water were stocked with fingerlings of /C. batrachus/ to overcome the occasional fish kill due to heavy bloom of algae. Studies were focussed mainly on the growth of /C. batrachus/ along with various chemical and biological operational parameters. The observations were extended for a period of two years and the fish attained an average weight of 550 gm. An attempt has been made to correlate incident energy and gross primary production with net fish yield both in the experiment and control. Availability of seed in large quantity and in selected size may enhance catfish culture in sewage fed and other types of water bodies in India.

77-000821 Loyacano, E. A., Jr.; Smith, D. C. ATTRACTION OF NATIVE FISH TO CATFISH CAGES IN RESERVOIRS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 63-73. 1975[1976]. SFA 22(3)

[Dep. Entomol. Econ. Zool., Clemson Univ., Clemson, SC 29631] Experimental gill nets were fished at sites with and without cages in which catfish were fed pelleted feed in lakes Hartwell and Keowee, South Carolina, during 1972, 1973, and 1974. Native fishes were identified, counted, and weighed. Of 34 species captured in the two lakes the most numerous were threadfin and gizzard shad, carp, bullhead species, white bass, bluegill, and largemouth bass. Total numbers of fish caught in each lake were greater at cage sites than at control sites after stocking cages, and total weight of fish caught in Lake Keowee was greater at cage sites than at control sites after stocking the cages and for the overall experiment, but not before stocking.

77-000822 McCoy, E. W.; Boutwell, J. L. PREPARATION OF FINANCIAL BUDGET FOR FISH PRODUCTION. CATFISH PRODUCTION IN AREAS WITH LEVEL LAND & ADEQUATE GROUND WATER. Auburn Univ. Agric. Exp. Stn. Circ. 233. 48p. Mar. 1977. SFA 22(3)

[Dep. Agric. Econ. Rural Sociol., Auburn Univ., Auburn, AL]

77-000823 Muratori, R. A.; Ghitino, P. PROCEDURE IN GIAPPONE LA SPERIMENTAZIONE SULL'ALLEVAMENTO DEL PEJERREY. [THE EXPERIMENTAL REARING OF PEJERREY (SILVERSIDE FISH) IS STILL PROGRESSING IN JAPAN.] Riv. It. Piscic. Ittip. 11 (4): 105-107. Oct.-Nov.-Dec. 1976. In Italian with English summ. SFA 22(3)

[Inst. Anat. Comp., Univ. Genova, Via Bulbi, 5-16126 Genova, Italy] At the Kanagawa Fresh Water Experimental Station, Japan, the pejerrey, a South American atherinid fish (or silverside), is being experimentally reared, after the importation of 170,000 eggs from Argentina in 1966. This fish is reproduced with natural methods, since it is extremely sensitive to handling stress. Japanese fisheries authority found the fish interesting but they consider it as a possible competitor with native species which are well inserted in Japanese aquaculture and fish marketing. The prudence of Japanese authority in accepting and promoting the fish in the country might be connected with some negative remarks to the species (small size, competition with plankton eaters). It may be accepted in the future by Japanese consumers which are seeking high price freshwater fish. The authors discussed a few details concerning the introduction of pejerrey (1973) in Italy. They concluded with some remarks on the pathology of such fish, both taking into account the eventual

77-000823 CONTINUED

introduction of exotic fish diseases and its reaction towards native fish diseases.

77-000824 Perry, W. G., Jr.; Avault, J. W., Jr. POLYCULTURE STUDIES WITH CHANNEL CATFISH AND BUFFALO. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 91-98. 1975[1976]. SFA 22(3)

[La. Wildl. Fish. Comm., Grand Chenier 70643] Polyculture studies were conducted in coastal brackish ponds evaluating buffalo (*Ictalurus punctatus*) and channel catfish (*Ictalurus punctatus*) combinations. The 1973 and 1974 southwest Louisiana studies demonstrated feeding to be necessary, without it, buffalo were found to compete with catfish for natural foods. Bigmouth buffalo (*I. cyprinellus*), black buffalo (*I. niger*), and bigmouth x black hybrid buffalo when stocked at 100 per acre with 1,600 and 2,000 catfish did not compete to any extent for supplemental feed. Addition of buffalo in some ponds actually resulted in increased catfish production. Results showed average buffalo production ranged up to 300 pounds per acre in addition to catfish production. The stocking of buffalo will supplement incomes where the demand for this fish is high.

77-000825 Pitcher, T. J. AN ENERGY BUDGET FOR A RAINBOW TROUT FARM. Environ. Conserv. 4 (1): 59-65. 1977. SFA 22(3)

[Sch. Biol. Environ. Sci., New Univ. Ulster, Coleraine, Northern Ireland] An industrial energy-budget for a Rainbow Trout farm shows that 93 percent of the energy costs of production are incurred in feeding the fish, seven-tenths of which is due to fishmeal incorporated in the food pellets. Only one-tenth of the input energy is converted into fish, but the energy subsidy of the farming operation compares favourable with conventional fishing and is 423 input megajoules per kg of output fish protein (55 MJ per kg wet-weight of fish landed). However, if the Trout could be fed on a diet composed of suitable vegetable protein, this performance would be improved to an overall conversion efficiency of one-third, and a subsidy of about 160 MJ per kg. A smaller but similar improvement could result if the Peruvian anchovy fishery regained its former production level. As these improved energy-costs are comparable with those of crops of potatoes, and with those of bread and milk production, a 2-men Rainbow Trout farm yielding 25 tonnes per year on one hectare would become an attractive protein-producing enterprise in localities where the necessary water-supply is available.--Summ.

77-000826 Robinette, H. R.; Finnie, D.; Whisler, F. D.; Young, J.; Miller, W. R.; Cannon, T. AERIAL SURVEILLANCE TO MONITOR WATER QUALITY IN CATFISH PONDS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 287-293. 1975[1976]. SFA 22(3)

[Dep. Wildl. Fish., Miss. State Univ., Mississippi State 39762] Remotely sensed data and ground truth data were collected simultaneously from 16 experimental ponds during 6 days in June and July, 1974. Color infrared images were taken with hand-held 35mm cameras from single engine aircraft. Numerical color values for pond color were obtained by visually matching the pond color with a Munsell Color System chip which had a standardized numerical value assigned to it. Ground truth data involved the determination of 14 chemical, physical, and biological parameters. Regression analysis indicated a significant correlation (P less than .01) existed only between total and inorganic solids and the Munsell Color System. There was evidence to suggest that the color-inorganic solid relationship was masked by the organic solids present.

77-000827 Schroeder, J. L. AGRICULTURAL WASTES IN FISH FARMING, A COMMERCIAL APPLICATION OF THE CULTURE OF SINGLE-CELLLED ORGANISMS FOR PROTEIN PRODUCTION. Water Res. 11 (4): 419-420. 1977. SFA 22(3)
[Fish Aquacult. Res. Stn., Dor, Israel]

77-000828 Snow, J. R.; Wright, C. F. REARING YARGMOUTH BASS FINGERLINGS IN CAGES. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 74-81. 1975(1976). SFA 22(3)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830]
Yargemouth bass /*Micropterus salmoides*/, Lac. fingerlings were successfully grown in cylindrical cages made of a synthetic netting fabric. Diet was Oregon Moist Pellet or floating trout pellets fed ad lib. Feed conversions ranged from 1.31 to 5.19 for 16 cage replications included in four trials. One trial was in the fall months when water temperature averaged 14.7°C. Another was during the fall and winter (144 days) when average water temperature was 12.8°C. The other two were done in the summer at an average water temperature of about 27°C. Survival was 83.7 percent or higher for all lots except two where side effects from a disease treatment caused mortality. Response of test animals to the cage environment was comparable with what had been observed in rearing this size bass on artificial feed in small earthen ponds. Cage design was satisfactory and the method shows promise for specialized use in bass culture.

77-000829 Spataru, P.; Hefher, P. COMMON CARP PREDATING ON TILAPIA FRY IN A HIGH DENSITY POLYCULTURE FISHPOND SYSTEM. Pamidqeh 29 (1): 25-28. Mar. 1977. SFA 22(3)
[Fish Aquacult. Res. Stn., Dor, Israel]

77-000830 Sundararaj, R. I.; Goswami, S. V. HORMONAL REGULATION OF /IN VIVO/ AND /IN VITRO/ OOCYTE MATURATION IN THE CATFISH, /HETEROPNEUSTES FOSSILIS/ (BLOCH). Gen. Comp. Endocrinol. 32 (1): 17-28. May 1977. SFA 22(3)
[Dep. Zool., Univ. Delhi, Delhi 110007, India] The hormonal regulation of /in vivo/ and /in vitro/ oocyte maturation in the catfish, /*Heteropneustes fossilis*/ has been investigated. Both piscine and mammalian gonadotropins which are very effective /in vivo/ maturation-inducing agents are virtually ineffective under /in vitro/ conditions, whereas steroids, specially C21 adrenal steroids are effective both under /in vivo/ and /in vitro/ conditions. In the catfish, gonadotropin seems to stimulate the interrenal to produce corticosteroids which in turn act on the oocyte to induce maturation. The mechanism of steroid-induced maturation has been investigated.

77-000831 Tweddle, D.; Turner, J. L. AGE, GROWTH AND NATURAL MORTALITY RATES OF SOME CICHLID FISHES OF LAKE MALAWI. J. Fish Biol. 10 (4): 385-398. Apr. 1977. SFA 22(3)
[UNDP/FAO, Fish. Res. Unit, P.O. Box 27, Monkey Bay, Malawi] The growth rates, lengths at maturity, fecundity and natural mortality of several cichlids of importance in trawl catches in Lake Malawi are described. Growth rates were determined by analysis of length frequency data from trawl catches. The breeding season for each species was determined by monthly examination of the gonads, and fecundity determined by egg counts from ripe ovaries. Lengths at maturity were calculated from the proportion of mature fish during breeding seasons. Natural mortality rates were determined from length frequency data from an unfished area of the lake. Values of the growth constant /K/ ranged from 0.487 to 0.671. The ratio of length at maturity to asymptotic length varied from 0.56 to 0.82. Growth

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parameters are compared with those of other cichlids. Most species mature in their third year. Fecundity was proportional to the square of the length in four of the five species. The species studied appeared to produce only one batch of eggs per breeding season. Instantaneous natural mortality rates ranged from 0.92 to 1.69.

77-000832 Walker, F. L.; Simco, R. A. AMMONIA PRODUCTION BY UNFED AND FED CHANNEL CATFISH IN A RECIRCULATING RACEWAY. J. Tenn. Acad. Sci. 52 (2): 73. Apr. 1977. SFA 22(3)

[Memphis State Univ., Memphis, TN] Abstract only. Channel catfish were cultured for 140 days in a recirculating raceway system. Ammonia production by fish maintained for four days without feeding remained constant over a 24 hour period at a rate of 0.051 mg NH₃(3)/Kg fish per minute. At feeding rates of 0.7, 0.7, and 1.4 percent body weight, the ammonia produced over a 24 hour period was 0.0225, 0.0211, and 0.0211 Kg NH₃(3)/Kg food, respectively. Ammonia production peaked 6 hours after feeding at each level; but as feeding levels increased, the percent production in the next 18 hours increased. Biological filters responded quickly to increased ammonia levels and the rate of nitrification increased with increased ammonia levels up to a concentration of 4 ppm. The maximum ammonia breakdown by the filter was 0.115 Kg NH₃(3) per day. Production of ammonia above this level exceeded the capacity of the filters and resulted in temporarily elevated ammonia concentrations in the system. The capacity of the biological filter thus limited the amount of food that could be used and thus limited the daily fish production in the system.

77-000833 Yant, D. P.; Smitherman, R. O.; Green, O. L. PRODUCTION OF HYBRID (BLUE X CHANNEL) CATFISH AND CHANNEL CATFISH IN PONDS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 82-86. 1975[1976]. SFA 22(3)

[Farm Fresh Catfish, Hollandale, MS 38748] Hybrid (blue /Ictalurus furcatus/ male x channel /I. punctatus/ female) channel catfish were grown separately at 3000/acre in 0.1-acre ponds for a growth period of 220 days. The average net yield was 3,752 pounds/acre for the hybrid catfish and 3,262 pounds/acre for the channel catfish. This difference was significant (P less than 0.01) with the hybrid catfish averaging 13.5 percent more pounds/acre than the channel catfish. When the two fish were compared in other commercially important aspects, the hybrid catfish was captured more easily by seining, more uniform in size, and had greater dress-out percentage. The channel catfish was slightly lower in fat and moisture percentage. No significant difference (P less than 0.05) was noted between the two catfishes in survival or protein percentage.

MARICULTURE

77-000834 Bryan, P. G.; Madraisau, B. B. LARVAL REARING AND DEVELOPMENT OF /SIGANUS LINEATUS/ (PISCES: SIGANIDAE) FROM HATCHING THROUGH METAMORPHOSIS. Aquaculture 10 (3): 243-252. Mar. 1977. SFA 22(3)

[Dist. Mar. Resour., Majuro, 96960, Marshall Islands] Larvae of /Siganus lineatus/ were hatched and reared through metamorphosis in a 7,000-l tank covered with a translucent roof. The larvae were fed phytoplankton (mixed cultures), rotifers (/Brachionus plicatilis/), copepods (/Oithona/ sp.), and /Artemia/ nauplii. Thirty-five days were required for all the larvae to metamorphose; survival was 800 out of 5,000 (16 percent). The rearing period and rearing criteria are

77-000834 CONTINUED

identical to those required for */S. canaliculatus/*. Three important developmental stages were identified: the dark-head carnivorous stage (the gut is a simple coil), the brown-head omnivorous stage (the gut is elongated and convoluted), and the juvenile herbivorous stage (the gut is highly elongated and convoluted into a complex coil). Over-feeding on */Artemia/* nauplii may result in deaths among brown-head and juvenile fishes; adjustment of the feeding regime when larvae begin to develop into the brown-head stage is considered important. Copepods are an excellent substitute for */Artemia/* nauplii during this period.

77-000835 Chepurinov, A. V. SOVIET ICHTHYOLOGY AND THE DEVELOPMENT OF MARINE AQUACULTURE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 199-203. 1976. SFA 22(3)
[INBYuM, Sevastopol, USSR]

77-000836 Leong, R. MATURATION AND INDUCED SPAWNING OF CAPTIVE PACIFIC MACKEREL, */SCOMBER JAPONICUS/*. NOAA Fish. Bull. 75 (1): 205-211. Jan. 1977. SFA 22(3)

[NMFS, Southwest Fish. Cent., La Jolla, CA 92038] Pacific mackerel, */Scomber japonicus/*, became sexually mature under laboratory conditions and were induced to spawn with hormone injections. Fish caught before the major spawning season became mature under the natural photoperiod and under artificial photoperiods of 4 h light 20 h dark, 8 h light 16 h dark, and 16 h light 8 h dark. Mackerel caught near the end of the spawning season redeveloped their gonads more rapidly at 18°C than at 15°C or ambient temperature. A 16°C-14 h light 10 h dark environment was effective in maintaining mackerel in spawning condition beyond the normal spawning season. Any of three combinations of hormones induced spawning: gonadotropin from ground salmon pituitary followed 24 h later by gonadotropin from pregnant mare serum; human chorionic gonadotropin followed 24 h later by gonadotropin from pregnant mare serum; and salmon pituitary plus human chorionic gonadotropin followed 24 h later by salmon pituitary plus human chorionic gonadotropin plus gonadotropin from pregnant mare serum. The hormones did not induce spawning when used individually. A procedure for routine spawning of Pacific mackerel is described.

77-000837 Villani, P. BREVE NOTA SULLA RIPRODUZIONE ARTIFICIALE DELLA SOGLIOLA ADRIATICA, */SOLFA (PFGUSA) IMPAR/* BENN. (TELEOSTEA SOLEIDAE). [SHORT NOTE ON THE ARTIFICIAL REPRODUCTION OF THE ADRIATIC SOLE, */SOLFA (PFGUSA) IMPAR/* BENN. (TELEOSTEA, SOLEIDAE).] Riv. It. Piscic. Ittiop. 12 (1): 15-20. Jan.-Feb.-Mar. 1977. In Italian with English summ. SFA 22(3)

[Lab. Sfruttamento Biol. Lagune - Lesina, Italy] Adriatic sole were caught along the shore of Northern Gargano (Adriatic Sea). After 1 hour from the catch the parents were injected by HCG hormone (Human chorionic gonadotropin) with a single injection of a small dose of 500 I.U. per specimen. Two females spontaneously spawned about 6,000-7,000 eggs after 1 day of treatment. The pelagic and spherical eggs were transparent and about $1013 \mu \pm 3.6 \mu$ in diameter; they were provided with many oil globules. Egg fertilization took place in sea water at a temperature of 20-22°C. The mean salinity was about $36 \pm 2\text{‰}$. The pH was similarly steady at 8.1-8.2. After 48-50 hours of incubation in a cement tank the eggs hatched and the prelarvae were 3 mm in length. About 4 days after the first hatching live food was offered. In this experiment small Rotifera */Brachionus plicatilis/* and Protozoa */Fabrea salina/* were used as food source. The sole larvae metamorphosed on the 16th-18th day at which they were reared on */Artemia salina/* nauplii and Metanauplii. At complete metamorphosis statistical percentage of final survival dropped to 28 percent of the

SPORT FISHERY ABSTRACTS

77-000837 CONTINUED
original eggs.--From abstr.

FEEDS, FEEDING AND NUTRITION

77-000838 Elliott, J. M. THE GROWTH RATE OF BROWN TROUT (*SALMO TRUTTA*/ L.) FED ON REDUCED RATIONS. J. Anim. Ecol. 44 (3): 823-842. Oct. 1975. SFA 22(3)
[Freshwater Biol. Assoc., Windermere Lab, Ambleside, Cumbria, England] Brown trout (live weight 5-281 g) were fed on various ration sizes ranging from zero to maximum rations at twelve different water temperatures (range 3.8-19.5° C). The optimum temperature for growth decreased progressively with decreasing ration from about 13° C at maximum ration to about 4° C at a ration size just above the maintenance ration. As the weight of the trout increased, the effect of temperature on growth rate at each ration size was progressively reduced. The rate of weight loss in starving fish remained fairly constant at temperatures below about 13° C but rapidly increased at higher temperatures. Both the weight of the trout and the water temperature affected the maintenance and maximum rations, and an equation was developed to estimate the 'scope for growth' between the maintenance and maximum rations. An equation was developed to describe the relationship between ration size and the growth rate expressed as a percentage of maximum growth rate. This equation was applicable to trout feeding on a variety of food organisms in both the stream and the laboratory, and at both constant and fluctuating temperatures between 3.8 and 19.5° C. The efficiency of food utilization was examined and an equation was developed to estimate the optimum ration, i.e. the the most efficient ration which produces the greatest growth for the least intake of food. The limitations of the '/K/-line' equation are discussed in detail.

77-000839 Elliott, J. M. THE GROWTH RATE OF BROWN TROUT (*SALMO TRUTTA*/ L.) FED ON MAXIMUM RATIONS. J. Anim. Ecol. 44 (3): 805-821. Oct. 1975. SFA 22(3)
[Freshwater Biol. Assoc., Windermere Lab., Ambleside, Cumbria, England] Brown trout (live weight 5-281 g) were fed to satiation at fifteen different water temperatures (range 3.8-21.7° C). Both the weight of the trout and the water temperature affected the mean specific rate of increase in weight ($G(w)^{\circ}/\text{oday}^{-1}$), and the relationship between the three variables was well described by an equation which can be used to estimate the value of $G(w)$ for trout in the weight range 10-300 g at temperatures between 3.8 and 19.5° C. The growth rate decreased markedly as the weight of the trout increased, and increased with increasing temperature from 3.8 to 12.8° C, was maximum between 12.8 and 13.6° C, and decreased with increasing temperature from 13.6 to 19.5° C. A general equation for growth was developed, and was found to be a good equation for describing the growth of both wild and hatchery-reared trout feeding on a variety of food organisms in both the stream and the laboratory. This equation was applicable to trout in the weight range 5-300 g at both constant and fluctuating temperatures between 3.8 and 19.5° C.

77-000840 Hilton, J. W.; Cho, C. V.; Slinger, S. J. FACTORS AFFECTING THE STABILITY OF SUPPLEMENTAL ASCORBIC ACID IN PRACTICAL TROUT DIETS. J. Fish. Res. Board Can. 34 (5): 683-687. May 1977. In English with French summ. SFA 22(3)

[Dep. Nutr., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

77-000841 Lucuet, P.; Leger, C.; Berget, F. EFFETS DE LA SUPPRESSION DES GLUCIDES DANS L'ALIMENTATION DE LA TRUITE ARC-EN-CIEL A LA TEMPERATURE DE 16 C. I.--CROISSANCE EN FONCTION DU NIVEAU D'INGESTION PROTEIQUE. [EFFECTS OF A SUCROSE-FREE DIET ON THE RAINBOW TROUT REARED AT A TEMPERATURE OF 16 C.I.--GROWTH ACCORDING TO PROTEIN INTAKE LEVEL.] Ann. Hydrobiol. 7 (2): 179-184. 1976. In French with English summ. SFA 22(3)

[Lab. Nutr. Poissons, Cent. Natl. Rech. Zootech., I.N.P.A., 78350 Jouy en Josas, France] The present work, made in connection with a series of studies on the metabolic utilization of carbohydrates in Salmonidae, concerns the influence of diets with or without sucrose on the growth of Rainbow trouts, according to two parameters: dietary protein level and environmental temperature. The growth of the groups fed a high protein diet with or without sucrose (L(55)S and L(65)) was identical and superior to that of the groups receiving a low protein diet (L(35)S and L(35)). The growth of group L(35) without sucrose, but fed the same amount of protein and lipids as group L(35)S, was 16 percent higher than that of group L(35)S, receiving 41 percent sucrose; the most favourable feed conversion ratio, protein efficiency ratio as well as utilization coefficients of protein and energy were observed in group L(35). Comparison of growth rates obtained at 16°C and 10°C with groups L(35) and L(35)S leads to the assumption that under our experimental conditions the metabolic utilization of sucrose was poor. Raising the temperature from 10°C to 16°C resulted, for all groups, in a faster growth rate, which can be partly explained by a higher feed intake relative to the metabolic mean weight and an increase in the feed conversion ratio due to increasing requirements for maintenance.--From abstr.

77-000842 McIarney, W. O.; Levine, J. S.; Sherman, M. M. MIDGE (CHIRONOMID) LARVAE AS GROWTH-PROMOTING SUPPLEMENT IN FISH AND LOBSTER DIETS. Bamidgah 29 (1): 17-24. Mar. 1977. SFA 22(3)

[Woods Hole Oceanogr. Inst., Woods Hole, MA] Larvae of a midge (a member of the /Chironomus tentans/ Fabricius group) were tested as a dietary supplement for the young of 2 species of fish (/Tilapia aurea/ Steindachner) and the Israeli mirror carp, /Cyprinus carpio/ var. specularis, (Lacepede). Control fish were fed a standard diet, comparable to what might be used in conventional aquaculture; test animals received the same diet supplemented with larvae amounting to 2 percent and 10 percent respectively, of the standard diet. Observed differences in carp growth rate were not significant, but the tilapia showed significant differences in growth between the animals receiving the 2 percent supplement and the controls. In some cases, significant differences were also observed between the animals receiving the 2 percent supplement and those receiving the 10 percent supplement, but these differences were always lower than those between either set of test animals and the controls.--From summ.

77-000843 Viola, S. ENERGY VALUES OF FEEDSTUFFS FOR CARP.
Bamidgeh 29 (1): 29-30. Mar. 1977. SFA 22(3)
["Milouhar", Israel]

77-000844 Yu, T. C.; Sinnhuber, R. O.; Putnam, G. R. USE OF SWINE
FAT AS AN ENERGY SOURCE IN TROUT RATIONS. Prog. Fish-Cult. 39 (2):
95-97. Apr. 1977. SFA 22(3)
[Dep. Food Sci. Technol., Oreg. State Univ., Corvallis 97331]

AQUARIUMS

77-000845 Prentice, E. F.; Gores, W. X. AUXILIARY AIR SYSTEM FOR
USE IN LABORATORY EMERGENCIES. Prog. Fish-Cult. 39 (2): 61. Apr.
1977. SFA 22(3)
[NMFS, Northwest Fish. Cent., Seattle, WA 98112]

MISCELLANEOUS CULTURE TECHNIQUES AND EQUIPMENT

77-000846 Harris, I. F. NITRIFYING BACTERIAL SUBSTRATES FOR
HATCHERY WATER RE-USE. Colo. Div. Wildl. Spec. Rep. no. 40. 29p.
Feb. 1977. Available at \$1.00 from Colo. Div. Wildl., Denver. SFA
22(3)
[Colo. Div. Wildl., Denver] A study was conducted on the nitrifying
capabilities of two commercial substrates: one, a 2-in. polypropylene
Flexring, and the other, a rigid vinyl module called "Flocor". The
substrates were examined as submerged and trickling filters.
Biological and chemical activation were also tested and compared.
Water samples were analyzed for ammonium (NH_4^+), ammonia NH_3 ,
nitrite (NO_2^-), nitrate (NO_3^-), pH, and oxygen to determine filter
performance. The Flexring filter performed well for the methods
tested. Although the Flexring substrate never reached its maximum
capacity for ammonia removal, it consistently out-performed the
Flocor. A longer activation period for the Flocor substrate might have
promoted a better filter performance. Chemical activation is a faster
and simpler method than biological activation to establish a
stabilized nitrifying colony on the substrates tested because higher
ammonia levels can be maintained chemically, insuring a quicker
nitrifying colony buildup.

77-000847 Lemon, D. W.; Regier, L. W. HOLDING OF ATLANTIC MACKEREL
(SCOMBER SCOMBRUS) IN REFRIGERATED SEA WATER. J. Fish. Res. Board
Can. 34 (3): 439-443. Mar. 1977. In English with French summ. SFA
22(3)

77-000848 Paulsen, C. I. APPARATUS FOR COLLECTION AND SEPARATION OF
INVERTEBRATE ORGANISMS FROM A POND, FOR USE AS FISH FOOD. Prog. Fish-
Cult. 39 (2): 101-102. Apr. 1977. SFA 22(3)
[Oceanic Inst., Makapuu Point, Waimanalo, HI 96795]

77-000849 Theis, G. L. WATER-POWERED FISH-CROWDING SCREEN AND RACEWAY CLEANER. Prog. Fish-Cult. 39 (2): 86-87. Apr. 1977. SFA 22(3)

[Lamar Fish Cult. Develop. Cent., Lamar, PA 16848]

GENERAL LIMNOLOGY AND OCEANOGRAPHY

77-000850 Dieffenbach, W.; Ryck, P., Jr. WATER QUALITY SURVEY OF THE ELK, JAMES AND SPRING RIVER BASINS OF MISSOURI, 1964-1965. Mo. Dep. Conserv. Aquatic Ser. No. 15. 25p. Mar. 1976. SFA 22(3)
[Mo. Dep. Conserv., Jefferson City] The water quality of 19 streams in the Elk, James and Spring river basins of Missouri was measured by studying types of aquatic life (bottom-dwelling invertebrate communities) at 52 sampling stations during the summer and autumn of 1964 and the winter and spring of 1965. Water quality assessments were based on the density, diversity and composition of samples. The structures of invertebrate communities at different stations were compared also by "coefficients of similarity". Water pollution substantially reduced the recreational, economic, and esthetic value of the stream resource of southwest Missouri. The survey revealed water pollution problems existed in 2 miles of stream in the Elk River basin, 31 miles of stream in the James River basin, and 65 miles of stream in the Spring River basin. A total of 98 miles of streams affected by pollution comprised about 10 percent of the total mileage of permanently flowing water in the study area.

77-000851 LaBounty, T. P.; Sartoris, J. J.; Poline, R. A. LIMNOLOGICAL RECONNAISSANCE OF SPENCE RESERVOIR, WYOMING. U.S. Bur. Reclam. Eng. Res. Cent. Rep. No. GR-2-77. vii + 48p. Dec. 1976. SFA 22(3)

[U.S. Bur. Reclam., Eng. Res. Cent., Denver, CO]

PHYSICAL LIMNOLOGY AND OCEANOGRAPHY

77-000852 Noble, R. D. PREDICTION OF NATURAL TEMPERATURES IN RIVERS. Ph.D. dissertation, Univ. Calif. (Davis) 230 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

77-000853 Tucker, W. A. THERMAL STRUCTURE OF LAKES. Ph.D. dissertation, Univ. Mich. 175 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

A numerical model capable of predicting the basin-averaged, vertical temperature distribution of lakes is presented. The tendency of large lakes to exhibit more vigorous turbulent mixing than small lakes is parameterized by consideration of the turbulence generated by breaking waves. It is assumed that wave generated turbulence mixes a near surface layer of depth proportional to the significant wave height and independent of the buoyancy flux in the layer. The model has been verified by simulation of observed temperature changes in two lakes: Lake Ontario, with a surface area of $1.8 \times 10^4 \text{ km}^2$, and Llyn Cwellyn, Wales, with a surface area of 1 km^2 . Model parameter values are identical for both cases. Root mean square deviations of observed and predicted temperature changes are generally about $.5^\circ\text{C}$. Finally, potential applications of this work are identified and discussed. The most likely use of the model would be as part of a one-dimensional

77-000853 CONTINUED

model of lake ecology. To demonstrate the model's utility in this area, a simple model for prediction of dissolved oxygen concentration is used to simulate dissolved oxygen profiles in Lake Ontario during mid-summer.--From abstr.

77-000854 Winterbourn, M. J. FLUXES OF LITTER FALLING INTO A SMALL BEECH FOREST STREAM. N. Z. J. Mar. Freshwater Res. 10 (3): 399-416. Sept. 1976. SFA 22(3)

[Dep. Zool., Univ. Canterbury, Christchurch, New Zealand] Fluxes of allochthonous litter were studied in a 93-m long section of a small stream flowing through mountain beech forest at Cass in the South Island of New Zealand. Litter entered the stream throughout the year with maximum input from October to March. Mean annual input of beech litter was estimated to be $567 \text{ g} \cdot \text{m}^{-2}$ (dry weight). Down-stream movement of litter correlated strongly with maximum stream discharge during the collection period. The seasonal distribution and accumulation of litter within the stream was examined using 1-mm-mesh colonisation trays. Litter was unevenly distributed over the stream bed, but the average amounts taken from riffles, pools, and among large stones were similar. Litter accumulations were greatest in a pool in summer. The most important factor governing the quantity and transport of litter within the stream was stream flow.

CHEMICAL LIMNOLOGY AND OCEANOGRAPHY

77-000855 Elder, F. C. (Chairman) ATMOSPHERIC CONTRIBUTION TO THE CHEMISTRY OF LAKE WATERS. J. Great Lakes Res. 2 (Suppl. 1): 1-225. 1976. SFA 22(3)

A collection of 17 papers presented at the First Specialty Symposium of the International Association for Great Lakes Research in 1975.--RS

77-000856 Scavia, D.; Chapra, S. C. COMPARISON OF AN ECOLOGICAL MODEL OF LAKE ONTARIO AND PHOSPHORUS LOADING MODELS. J. Fish. Res. Board Can. 34 (2): 286-290. Feb. 1977. In English with French summ. SFA 22(3)

[NMFS, Great Lakes Environ. Res. Lab., Ann Arbor, MI 48104]

BENTHOS

77-000857 Ellis, J. F.; Tackett, D. L. CONFS FOR SAMPLING ACCUMULATED SOLIDS IN PONDS. Prog. Fish-Cult. 39 (2): 66. Apr. 1977. SFA 22(3)

[U.S. FWS, Fish Farm. Exp. Stn., Stuttgart, AR 72160]

77-000858 Hepworth, D. K. BENTHIC FAUNA OF RECENTLY INUNDATED AREAS OF LAKE POWELL, UTAH-ARIZONA. Utah State Div. Wildl. Resour. Publ. no. 76-17. 10p. 1976. SFA 22(3)

[Utah Div. Wildl. Resour., Salt Lake City] Littoral benthic communities, important as a source of food for young centrarchids, were studied in recently inundated areas of Lake Powell after spring filling. Although numbers of organisms never became great, colonization of new areas occurred within a short time and maximum densities were reached in early August. Genera of the more commonly

77-000858 CONTINUED

found chironomids peaked in abundance at times during July, August, and September. Changes in density of different chironomids and occurrence of pupae in most samples indicates emergence took place throughout the summer and early fall.

77-000859 Hodkinson, J. D. A COMMUNITY ANALYSIS OF THE BENTHIC INSECT FAUNA OF AN ABANDONED BEAVER POND. J. Anim. Ecol. 44 (2): 533-551. June 1975. SFA 22(3)

[Dep. Biol., Liverpool Polytech., Byrom street, Liverpool L3 3AF, England] In a shallow cool temperate pond Diptera of the families Tipulidae and Stratiomyidae were the major faunal components. All species except one had a single, well synchronized adult emergence period within the interval May-October. Using Cluster analyses of matrices of coefficients of association, seven faunal elements, each exhibiting a different distribution pattern in four defined areas of the pond, were identified. The main sediment variables which influenced larval distributions were particle size, organic content and carbon/nitrogen ratio. A flocculent high organic content sediment contained a more diverse fauna than a compacted low organic sediment. In the larvae of all non-predatory species examined allochthonous vascular plant material was the dominant food component. However, feeding studies on *Stratiomysharhata* indicated that such material alone was not a nutritious food source and that the presence of attached micro-organisms was necessary for growth. In the pond three major functional feeding groups were recognized, namely shredders, collectors and predators. The shredders reduce the size of organic particles and make available to the collectors the small particles on which they feed.--From summ.

77-000860 LaBounty, J. F. STUDIES OF THE BENTHIC ENVIRONMENT OF TWIN LAKES, COLORADO. U.S. Dep. Interior, Bureau Reclamation Rep. No. REC-ERC-76-12. iv + 47p. Oct. 1976. SFA 22(3)

[U.S. Bur. Reclamation, Eng. Res. Cent., Denver, CO] This report covers one aspect of an overall study which is being made to evaluate what effects the operation of the Mt. Elbert Pumped-Storage Powerplant has on the ecology of a montane lake. Based on these studies, the lower lake was found to have a benthic fauna similar to other oligotrophic lakes of North America, while at times, the upper lake is nearly depopulated. Analyses of sediment indicate that since the turn of the century, heavy metals and nutrient input have significantly increased.--From abstr.

77-000861 Mandal, R. K.; Moitra, S. K. SEASONAL VARIATIONS OF BENTHOS AND BOTTOM SOIL EDAPHIC FACTORS IN A FRESHWATER FISH POND AT BURDWAN, WEST BENGAL. Trop. Ecol. 16 (1): 43-48. 1975. SFA 22(3)

[P.G. Dep. Zool., Bhagalpur Univ., Bhagalpur-7, (Bihar), India] Studies on the seasonal variations of total benthos volume and bottom soil edaphic factors were carried out in a freshwater fish pond at Burdwan. It was observed that the total benthos volume was highest in winter and lowest in summer. Bottom soil was acidic throughout the period of studies and it was due to the use of acid forming fertilizers. Nitrate, phosphate and silicate varied bimodally and the peaks generally appeared in summer and autumn while the troughs were recorded in winter and monsoon. Highest percentage of organic carbon was recorded in April. The variations of organic matter content of the bottom soil was similar to that of the organic carbon. High amount of organic matter facilitated the growth of *Chironomus* larvae. Increase population of benthos with the increase of organic matter in the soil has been confirmed in the present studies.--Summ.

SPORT FISHERY ABSTRACTS

- 77-000862 Prater, B. L.; Rakton, D. R.; Olive, J. H. NEW SAMPLER FOR SHALLOW-WATER BENTHIC MACROINVERTEBRATES. Prog. Fish-Cult. 39 (2): 57-58. Apr. 1977. SFA 22(3)
[Biol. Dep., Heidelberg Coll., Tiffin, OH 44883]
- 77-000863 Saether, O. A. FEMALE GENITALIA IN CHIRONOMIDAE AND OTHER NEMATOCERA: MORPHOLOGY, PHYLOGENIES, KEYS. Bull. Fish. Res. Board Can. 197. viii + 209p. 1977. In English with French summ. SFA 22(3)
[Fish. Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]
- 77-000864 Saether, O. A. REVISION OF /HYDROBAENUS/, /TRISSOCLADIUS/, /ZALUTSCHIA/, /PARATRISSOCLADIUS/, AND SOME RELATED GENERA (DIPTERA: CHIRONOMIDAE). Bull. Fish. Res. Board Can. 195. vi + 287p. 1976. In English with French summ. SFA 22(3)
[Fish. Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]
- 77-000865 Saether, O. A. TAXONOMIC STUDIES ON CHIRONOMIDAE: /NANOCLADIUS/, /PSUDOCHIRONOMUS/, AND THE /HARNISCHIA/ COMPLEX. Bull. Fish. Res. Board Can. 196. viii + 143p. 1977. SFA 22(3)
[Fish. Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]
- 77-000866 Townsend, C. R.; Hildrew, A. G. FIELD EXPERIMENTS ON THE DRIFTING, COLONIZATION AND CONTINUOUS REDISTRIBUTION OF STREAM BENTHOS. J. Anim. Ecol. 45 (3): 759-772. Oct. 1976. SFA 22(3)
[Sch. Biol. Sci., Univ. East Anglia, University Plain, Norwich NR1 7TJ, England] This study evaluated the role that invertebrate drift plays in the colonization of new areas of stream bed, exposed both experimentally and naturally. Concurrent experiments were performed on the spatial and temporal variability of drift, and estimates were made of the rate and extent of drift mediated losses and gains by all the principal taxa of the benthic community. Of movements involved in the colonization of experimentally introduced substrate, 82 percent were by drifting. The average naturally-occurring density of the stream benthos would be achieved on new substrate after approximately thirty-eight days of colonization. These relatively high rates of movement occurred even though local flow rates were often less than 5 cm s⁻¹. There was a significant correlation between colonization rate and local water velocity. The continuous process of benthic redistribution cannot fail to serve a dispersive role for young stages to all habitats in the stream benthic community.--From summ.
- 77-000867 Voshell, J. R., Jr. THE MACROBENTHOS OF A NEW RESERVOIR, LAKE ANNA, LOUISA COUNTY, VIRGINIA. Ph.D. dissertation, Va. Polytech. Inst. & State Univ. 222 p. 1977. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)
The macrobenthos of a new reservoir in central Virginia, Lake Anna, was studied for the first three years after impoundment, 1972-1975. Prior to this, extensive macrobenthic collections had been made in the river destined for impoundment, the North Anna River. The biota of this river had been seriously affected by acid mine drainage for over 100 years. Following impoundment, there was an immediate change in macrobenthic community structure. Colonization of the new reservoir occurred very quickly, especially during the first summer period. The acid mine drainage did not affect the distribution of macrobenthos in the new reservoir, probably because of dilution. The development of macrobenthic community structure in Lake Anna followed the general trends expected in ecological succession. These trends are increased

SPORT FISHERY ABSTRACTS

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number of species, increased equitability of species composition, and better organization of distribution. A comparison of the development of macrobenthos in new reservoirs with a model of expected productivity indicated that the abundance of macrobenthos may also exhibit the same trends as productivity. These trends are an initial increase in productivity for several years, followed by a sharp decline for several years, to be finally followed by a small increase and stabilization. This sequence of events probably requires at least 15 years for macrobenthos.--From abstr.

77-000868 Ward, J. V. BOTTOM FAUNA-SUBSTRATE RELATIONSHIPS IN A NORTHERN COLORADO TROUT STREAM: 1945 AND 1974. Ecology 56 (6): 1429-1434. 1975. SFA 22(3)

[Dep. Zool. Entomol., Colo. State Univ., Fort Collins 805231] A study of bottom fauna-substrate relationships conducted on North St. Vrain Creek, Colorado, USA in 1945 was repeated in 1974 to determine changes in the stream environment and in the community structure and standing crop of macroinvertebrates. The stream remains a clear, unpolluted trout stream with soft water of neutral pH. Despite differences in flow, temperature, and riparian vegetation, macroinvertebrate composition was similar to that of 1945; most differences can be attributed to normal year-to-year fluctuations and slight shifts in emergence periods. Total density was less on all substrata in 1974, which is attributed to the higher discharge. Total biomass was comparable except for lower values on bedrock in 1974.

PLANKTON

77-000869 Coull, B. C. MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. COPEPODA: HARPACTICOIDA. NOAA Tech. Rep. NMFS Circ. 399. iii + 18p. Mar. 1977. SFA 22(3)

[Dep. Biol., Univ. S. Car., Columbia 292081]

77-000870 Coull, B. C. MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. COPEPODA: HARPACTICOIDA. NOAA Tech. Rep. NMFS Circ. 399. iii + 48 p. Mar. 1977. SFA 22(3)

[Dep. Biol., Univ. S. Car., Columbia 292081]

MORPHOLOGY

77-000871 Allen, J. M.; Blaxter, J. H. S.; Denton, E. J. THE FUNCTIONAL ANATOMY AND DEVELOPMENT OF THE SWIMBLADDER-INNER LATERAL LINE SYSTEM IN HERRING AND SPRAT. J. Mar. Biol. Assoc. U. K. 56 (2): 471-486. May 1976. SFA 22(3)

[Dunstaffnage Mar. Res. Lab., Oban, Argyll, Scotland]

SPORT FISHERY ABSTRACTS

77-000872 Anthony, J.; Pabineau, D. [ON SOME JUVENILE CHARACTERS OF /LATIMERIA CHALUMNAE/ SMITH (PISCES, CROSSOPTERYGII, COELACANTHIDAE)]. C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 183 (16): 1739-1742. 20 Dec. 1976. In French with English summ. SFA 22(3)

[Lab. Anat. Comp., Mus. Natl. Hist. Nat., 55, rue de Buffon, 75005 Paris, France]

77-000873 Bauchot, R.; Baychot, M. L.; Platel, P. L.; Ridet, J. M. BRAINS OF HAWAIIAN TROPICAL FISHES; BRAIN SIZE AND EVOLUTION. Copeia 1977 (1): 42-46. 16 Mar. 1977. SFA 22(3)

[Lab. Anat. Comp., Univ. Paris 7, Paris, France]

77-000874 Beedle, D.; Geordi, T. THE KIDNEY OF THE CHONDROSTEAN FISH, /POLYODON SPATHULA/ (WAUPAUM). Proc. Nehr. Acad. Sci. Affil. Soc. 87: 7. Apr. 1977. SFA 22(3)

[Dep. Biol., Creighton Univ., Omaha, NE 68178] Abstract only.

77-000875 Bell, M. A. THE EVOLUTION OF PHENOTYPIC DIVERSITY IN THREESPINE STICKLEBACKS (/GASTROSTEUS ACULEATUS/). Ph.D. dissertation, Univ. Calif. (Los Angeles). 208 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

77-000876 Berkovitz, B. K. B. CHRONOLOGY OF TOOTH DEVELOPMENT IN THE RAINBOW TROUT (/SALMO GAIRDNERI/). J. Exp. Zool. 200 (1): 65-70. Apr. 1977. SFA 22(3)

[Dep. Anat., Med. Sch., Univ. Bristol, University Walk, Bristol BS8 1TD, England]

77-000877 Best, A. C. G.; Bone, O. ON THE INTEGUMENT AND PHOTOPHORES OF THE ALIPOCEPHALID FISHES /XENODERMICHTHYS/ AND /PHOTOSTYLUS/. J. Mar. Biol. Assoc. U.K. 56 (1): 227-236. Feb. 1976. SFA 22(3)

[The Lab., Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

77-000878 Bone, O.; Chubb, A. D. ON THE STRUCTURE OF CORPUSCULAR PROPRIOCEPTIVE ENDINGS IN SPARKS. J. Mar. Biol. Assoc. U. K. 56 (4): 925-928. Nov. 1976. SFA 22(3)

[The Lab., Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

77-000879 Bone, O.; Chubb, A. D. THE STRUCTURE OF STRETCH RECEPTOR ENDINGS IN THE FIN MUSCLES OF PAYS. J. Mar. Biol. Assoc. U.K. 55 (4): 939-943. Nov. 1975. SFA 22(3)

[The Lab., Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

77-000880 Bullock, A. M.; Roberts, R. J.; Gordon, J. D. M. A STUDY ON THE STRUCTURE OF THE WHITING INTEGUMENT (/MERLANGIUS MERLANGUS/ L.). J. Mar. Biol. Assoc. U.K. 56 (1): 213-226. Feb. 1976. SFA 22(3)

[Dunstaffnage Mar. Res. Lab., Oban, Argyll, Scotland]

SPORT FISHRY ABSTRACTS

77-000881 Castle, P. H. J. OSTEOLOGY AND RELATIONSHIPS OF THE FFL /DIASTOBRANCHUS CAPENSIS/ (PISCES, SYNAPHOBANCHIDAE). Pac. Sci. 29 (2): 159-163. Apr. 1975. SFA 22(3)

[Dep. Zool., Victoria Univ. Wellington, Private Bag, Wellington, New Zealand] An osteological comparison of /Diastobranchnus/ (using its single species /D. capensis/ Barnard, 1923, known only from the Southern Ocean) with other synaphobranchoid eels shows that it is intermediate between /Synaphobranchus/ and /Ilyophis/ (Synaphobranchidae). The Simenchevidae is more generalized, whereas the Dysommidae contain the more specialized of the Synaphobranchoidae.

77-000882 Colman, J. A. GEOGRAPHICAL VARIATION IN FIN RAY NUMBERS IN THE NEW ZEALAND SAND FLOUNDER /RHOMBOSOLEA PLEBEIA/ (RICHARDSON). N. Z. J. Mar. Freshwater Res. 10 (3): 485-497. Sept. 1976. SFA 22(3)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] The numbers of dorsal and anal fin rays were compared in samples of sand flounder /Rhombosolea plebeia/ (Richardson) collected from different localities around the coasts of New Zealand. Fin ray numbers were highest on the west coast of the North Island, particularly in the South Taranaki Bight, and were lowest on the east and south coasts of the South Island. Within the areas studied five regions were recognised within which the mean numbers of fin rays were relatively constant, but between which the mean numbers of fin rays differed considerably. The significance of these differences is discussed.

77-000883 Corwin, J. T. MORPHOLOGY OF THE MACULA NEGLECTA IN SHARKS OF THE GENUS /CARCHARINUS/. J. Morphol. 152 (3): 341-351. June 1977. SFA 22(3)

[Neurobiol. Unit, Scripps Inst. Oceanogr., La Jolla, Calif. 92093]

77-000884 Dahlberg, W. D. MIDDORSAL SPINES IN STINGRAYS (/DASYATIS/) OF THE GEORGIA COAST. Fla. Sci. 40 (1): 84-86. 1977. SFA 22(3)

[Ecol. Sci. Div., NUS Corp., 1910 Cochran Rd., Pittsburgh, PA 15220] A proposed procedure for counting middorsal spines provides for a reliable separation of the Atlantic stingray (/Dasyatis sabina/) from other sympatric species (/D. sayi, /D. americana/, /D. centroura/) on the U.S. Atlantic coast. Middorsal spines were apparent when /D. sabina/ reached 149 to 170 mm disc width and increased with body size. Rate of spine development decreased when disc width reached 250 mm. Rate of spine development was similar in both sexes of /D. sabina/ although females reached a much larger size.

77-000885 Denton, P. J.; Playter, J. H. S. THE MECHANICAL RELATIONSHIPS BETWEEN THE CIOPEID SWIMBLADDER, INNER EAR AND LATERAL LINE. J. Mar. Biol. Assoc. U. K. 56 (3): 797-807. Aug. 1976. SFA 22(3)

[The Lab., Mar. Biol. Assoc., Citadel Hill, Plymouth, England]



77-000886 Eakin, P. P. THE OSTEOLOGY AND RELATIONSHIPS OF THE FISHES OF THE ANTARCTIC FAMILY HARPACIPEPIDAE (PISCES, NOTOTENUIDAE). Ph.D. dissertation, Univ. Me. 252 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

77-000887 Eastman, J. T. THE PHARYNGEAL BONES AND TEETH OF CATOSTOMID FISHES. Am. Midl. Nat. 97 (1): 68-88. Jan. 1977. SFA 22(3)

[Div. Biol. Med. Sci., Brown Univ., Providence, RI 02912]

77-000888 Forrester, C. R.; Alderdice, D. F. LABORATORY OBSERVATIONS ON EARLY DEVELOPMENT OF THE PACIFIC HALIBUT (/HIPPOGLOSSUS STENOIEPIS/). Int. Pac. Halibut Comm. Tech. Rep. No. 9. 13p. 1973. Available from Int. Pac. Halibut Comm., P.O. Box 9, University Station, Seattle, WA 98105. SFA 22(3)

[Int. Pac. Halibut Comm., Seattle, WA] Eggs of the Pacific halibut (/Hippoglossus stenolepis/) were artificially fertilized and incubated in water of 33‰ salinity at temperatures of 2 to 12°C. Hatching occurred at temperatures of 5, 6, 7 and 8°C. Time to 50 percent hatching ranged from 12.5 days (8°C) to 20 days (5°C). Mean larval size at hatching ranged from 6.03 to 7.24 mm; the largest larvae were hatched at 6°C. At hatching the length of yolk sac was approximately 50 percent of the total larval length. The observations complement information provided through earlier field studies by the International Pacific Halibut Commission.

77-000889 Friebourgh, J. H.; Soloff, R. I. SCANNING ELECTRON MICROSCOPY OF THE RAINBOW TROUT (/SALMO GAIRDNERI/ RICHARDSON) SPERMATOZOON. Proc. Ark. Acad. Sci. 30: 41-43. 1976. SFA 22(3)

[Univ. Ark., Little Rock 72204] The scanning electron microscope was used to determine the morphology of the rainbow trout (/Salmo gairdneri/ Richardson) spermatozoon. The Spermatozoon is approximately 32 µm long and consists of a head, mitochondrial collar, and flagellum. The head is elongated and somewhat flattened. It has an antero-posterior length of 3.1 µm and a maximum diameter of 1.6 to 2.2 µm. Mean antero-posterior length of the mitochondrial collar is 0.8 µm. The collar encircles the flagellum but is separated from it. The flagellum ranges in length from 26 to 31 µm and is divided into a principal piece and end piece. Cytoplasmic vesicles commonly are found in the anterior region of the flagellum.

77-000890 Fritzsche, P. A. FIRST DESCRIPTION OF THE ADULT MALE OF MICROGNATHUS BRACHYPHYNUS (PISCES, SYNGNATHIDAE). Pac. Sci. 29 (3): 267-268. July 1975. SFA 22(3)

[Scripps Inst. Oceanogr., La Jolla, CA 92037]

77-000891 Hambrick, P. S.; Spieler, P. F. MOUTHLESS CYPRINIFORM FISHES FROM LOUISIANA AND ARKANSAS. Southwest. Nat. 22 (1): 143-146. 1 Mar. 1977. SFA 22(3)

[Mus. Zool., La. State Univ., Baton Rouge 70893]

77-000892 Hocutt, C. F.; Stauffer, J. R., Jr. BAPPEL ANOMALY IN /NOTURUS FLAVUS/ RAFINESQUE. Proc. Pa. Acad. Sci. 50 (2): 117-118. 1976. SFA 22(3)
[Univ. Md., Gunter Hall, Frostburg 21532]

77-000893 Jenkins, D. B. A LIGHT AND ELECTRON MICROSCOPIC STUDY OF THE INNER EAR IN SELECTED SPECIES OF CATFISHES (SILUROIDEI). Ph.D. dissertation, Pa. State Univ. 202 p. 1975. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

77-000894 Kamel, A.; Nawar, G.; Yoakim, F. G. ON THE FUNCTIONAL MORPHOLOGY OF THE ALIMENTARY TRACT OF THE NILE CYPRINOID /LABO NILOTICUS/ IN RELATION TO ITS FEEDING HABITS. I: ANATOMY AND HISTOLOGY OF THE BUCCAL CAVITY AND PHARYNX. Jibyan J. Sci. 4B: 1-13. 1975. SFA 22(3)
[Dep. Zool., Ain Shams Univ., Cairo, Egypt]

77-000895 Kemp, A. THE PATTERN OF TOOTH PLATE FORMATION IN THE AUSTRALIAN LUNGFISH, /NEOCERATODUS FORSTERI/ KREFFT. Zool. J. Linn. Soc. 60 (3): 223-258. Apr. 1977. SFA 22(3)
[Dep. Zool., Univ. Queensland, St. Lucia, Brisbane, Queensland 4037, Australia]

77-000896 Kotlyar, A. N. A MORPHOLOGICAL DESCRIPTION OF THE PERUVIAN JACK MACKEREL, /TRACHURUS SYMMETRICUS MURPHYI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 45-55. 1976. SFA 22(3)
[VNIRO, Moscow, USSR]

77-000897 Krykhtin, M. L. MORPHOLOGICAL AND PHYSIOLOGICAL INDICATORS OF THE KALUGA STURGEON, /HUSO DAURICUS/ FROM THE AMUR ESTUARY. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 259-270. 1976. SFA 22(3)

[TINRO, Khabarovsk, USSR] Changes in the indices of the heart, liver, spleen and coelomic fat of the Kaluga sturgeon, /Huso dauricus/, from the Amur estuary are considered in relation to body weight, age and gonadal development. The differentiation of the population into constitutionally different fish in the process of ontogeny is noted.

77-000898 Laerm, J. EVOLUTION AND HOMOLGY OF THE OSTREICHTHYAN CENTRUM. Ph.D. dissertation, Univ. Ill. (Urbana-Champaign). 364 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

77-000899 Mahnert, V.; Gery, J. LA MACHOIRE SUPERIEURE DE CERTAINS /BARBUS/ S.L. (PISCES, CYPRINIFORMES) AFRICAINS. [THE UPPER JAW OF SOME AFRICAN /BARBUS/ S.L. (PISCES, CYPRINIFORMES).] Rev. Suisse Zool. 84 (1): 229-236. 1977. In French with English and German summ. SFA 22(3)

77-000900 Manner, H. W.; VanCura, M.; Muehleman, C. THE ULTRASTRUCTURE OF THE CHORION OF THE FATHEAD MINNOW, /PIMEPHALES PROMELAS/. trans. Am. Fish. Soc. 106 (1): 110-114. Jan. 1977. SFA 22(3)

[Dep. Biol., Univ. Lovola, Chicago, IL 60626]

77-000901 Mook, D. LARVAL AND OSTEOLOGICAL DEVELOPMENT OF THE SHEEPSHEAD, /ARCHOSARGUS PROBATOCEPHALUS/ (PISCES: SPARIDAE). Copeia 1977 (1): 126-133. 16 Mar. 1977. SFA 22(3)

[Harbor Br. Found., Inc., Sci. Lab., Ft. Pierce, FL 33450] The larval development of the sheepshead, /Archosargus probatocephalus/ is similar to that of other perciform fishes. The caudal and the pectoral fins are the first to form and the pelvic the last. The yolk sac disappears at about 4.5 mm SL and adult color patterns begin to appear at about 7 mm and are complete by 15 mm. The development of basic pigmentation pattern is described. The osteological development of the skull, axial skeleton, fin supports and caudal elements is also described.

77-000902 Moore, C. J.; Hixson, J. H. INCIDENCE OF CROOKED VERTEBRAL COLUMNS IN ADULT POTOMAC RIVER WHITE PERCH, /MORONE AMERICANA/. Copeia 1977 (2): 384-387. 25 May 1977. SFA 22(3)

[Benedict Estuarine Res. Lab., Benedict, MD 20612]

77-000903 Munk, O. THE VISUAL CELLS AND RETINAL TAPETUM OF THE ROYALTE DEEP-SEA FISH /SCOPFLOSAURUS LEPIDUS/ (TELEOSTEI). Zoomorphologie 87 (1): 21-49. 1977. SFA 22(3)

[Inst. Comp. Anat., Universitetsparken 15, D-K-2100 Copenhagen O, Denmark]

77-000904 Obika, M. PIGMENT MIGRATION IN ISOLATED FISH MELANOPHORES. Annot. Zool. Jpn. 49 (3): 157-163. Sept. 1976. SFA 22(3)

[Dep. Biol., Keio Univ., Yokohama, Kanagawa 223, Japan] Pigment migration and concurrent change in cell shape in isolated melanophores of the teleost /Oryzias latipes/ are described. Isolated, freely floating melanophores respond to epinephrine with a rapid aggregation of melanosomes accompanied by retraction of dendritic processes. Subsequent perfusion of theophylline induces the formation of numerous protrusions followed by a slow redispersion of melanosomes. In the cells adhered firmly to the substratum, epinephrine elicits the aggregation of a large portion of inner cytoplasmic components together with the centripetal melanosome migration. Dendritic processes and peripheral area become extremely thin during this period. Theophylline induces an immediate redispersion of melanosomes. The anisometric morphology of melanophores appears to be determined rather extrinsically.

77-000905 Paul, D. H.; Roberts, B. L. STUDIES ON A PRIMITIVE CEREBELLAR CORTEX. I. THE ANATOMY OF THE LATERAL-LINE LOOPS OF THE DOGFISH, /SCYLIORHINUS CANICULA/. Proc. R. Soc. Lond. B Biol. Sci. 195 (1121): 453-466. Feb. 1977. SFA 22(3)

[Dep. Physiol., Univ. Manchester, Manchester, England]

- 77-000906 Paul, D. H.; Roberts, P. L. STUDIES ON A PRIMITIVE CEREBELLAR CORTEX. III. THE PROJECTION OF THE ANTERIOR LATERAL-LINE NERVE TO THE LATERAL-LINE LOBES OF THE DOGFISH BRAIN. *Proc. R. Soc. Lond. B Biol. Sci.* 195 (1121): 479-496. Feb. 1977. SFA 22(3)
[Dep. Physiol., Univ. Manchester, Manchester, England]
- 77-000907 Paul, D. H.; Roberts, P. L. STUDIES ON A PRIMITIVE CEREBELLAR CORTEX. II. THE PROJECTION OF THE POSTERIOR LATERAL-LINE NERVE TO THE LATERAL-LINE LOBES OF THE DOGFISH BRAIN. *Proc. R. Soc. Lond. B Biol. Sci.* 195 (1121): 467-478. Feb. 1977. SFA 22(3)
[Dep. Physiol., Univ. Manchester, Manchester, England]
- 77-000908 Rajbanshi, V. K. THE ARCHITECTURE OF THE GILL SURFACE OF THE CATFISH, /HETEROPNEUSTES FOSSILIS/ (BLOCH): SEM STUDY. *J. Fish Biol.* 10 (4): 325-329. Apr. 1977. SFA 22(3)
[Dep. Zool., Univ. Udaipur, Udaipur-313001, India]
- 77-000909 Reifel, C. W.; Travill, A. A. STRUCTURE AND CARBOHYDRATE HISTOCHEMISTRY OF THE ESOPHAGUS IN TEN TELEOSTEAN SPECIES. *J. Morphol.* 152 (3): 303-314. June 1977. SFA 22(3)
[Dep. Anat., Queen's Univ., Kingston, ON, Canada]
- 77-000910 Reynolds, W. W.; Karlotski, W. J. THE ALLOMETRIC RELATIONSHIP OF SKELETON WEIGHT TO BODY WEIGHT IN TELEOST FISHES: A PRELIMINARY COMPARISON WITH BIRDS AND MAMMALS. *Copeia* 1977 (1): 160-163. 16 Mar. 1977. SFA 22(3)
[Dep. Biol., Pa. State Univ., Wilkes-Barre 18708]
- 77-000911 Santer, P. M. THE DISTRIBUTION OF COLLAGEN BUNDLES AND AN EPICARDIAL CORONARY VASCULATURE IN THE PLAICE (/PLEURONECTES PLATESSA/ L.) HEART VENTRICLE AT DIFFERENT AGES. *J. Mar. Biol. Assoc. U.K.* 56 (1): 241-246. Feb. 1976. SFA 22(3)
[Dep. Anat., University College, Cardiff, Wales]
- 77-000912 Tesoriero, J. V. A MORPHOLOGICAL, HISTOCHEMICAL AND AUTORADIOGRAPHIC STUDY OF THE FORMATION OF THE CHORION IN THE TELEOST, /ORYZIAS LATIPES/. Ph.D. dissertation, State Univ. N.Y., Downstate Med. Cent. 204 p. 1976. *From Diss. Abstr. Int. B. Sci. Eng.* 37(8), 1977. SFA 22(3)
- 77-000913 Verigin, I. A. THE STRUCTURE OF THE ALIMENTARY CANAL IN AMERICAN CATOSTOMIDS OF THE GENUS /ICTIOBUS/ (CYPRINIFORMES, CATOSTOMIDAE). I. BIGMOUTH BUFFALO /ICTIOBUS CYPRINELLA/. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 16 (1): 88-95. 1976. SFA 22(3)
[Zool. Mus., Moscow Univ., USSR] The anatomic and histologic structure of the alimentary canal of the American catostomid, the bigmouth buffalo, /*Ictiobus cyprinella*/, is described. A number of features distinguishing the digestive organs of this species from those of cyprinids are noted: the nature of the pharyngeal teeth, the absence of a gastrolith, the presence in the anterior part of the intestines of a dilatation, provided with a powerful musculature and evidently acting as a mechanical food processor. The presence of the stratum compactum in the mucous membrane of the gut.

SPORT FISHERY ABSTRACTS

77-000914 Wassersug, R. J.; Johnson, R. K. A REMARKABLE PYLORIC CAECUM IN THE EVERMANNIID GENUS /COCCORELLA/ WITH NOTES ON GUT STRUCTURE AND FUNCTION IN ALEPISAUPOID FISHES (PISCES, MYCTOPHIFORMES). J. Zool. (Lond.) 179 (2): 273-289. June 1976. SFA 22(3)
[Dep. Anat., Univ. Chicago, Chicago, IL]

77-000915 White, D. S. EARLY DEVELOPMENT AND PATTERN OF SCALE FORMATION IN THE SPOTTED SUCKER, /MNYTREMIA MEIANOPS/ (CATOSTOMIDAE). Copeia 1977 (2): 400-403. 25 May 1977. SFA 22(3)
[Univ. Okla. Biol. Stn., Kingston 73439]

77-000916 Yoakim, E. G. HISTOLOGICAL STUDIES ON THE OVARY OF THE NILE CATFISH /SCHILBE MYSTUS/ (L.) WITH SPECIAL REFERENCE TO THE PROCESS OF OÖGENESIS. Libyan J. Sci. 4B: 15-22. 1975. SFA 22(3)
[Dep. Zool., Assiut Univ., Egypt]

77-000917 Zolotavina, L. A.; Mukhachev, I. S. THE REASON FOR THE FORMATION OF ADDITIONAL RINGS ON THE SCALES OF THE PELYAD, /COREGONUS PELED/, AND THE BROAD WHITEFISH, /COREGONUS NASUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 157-163. 1976. SFA 22(3)
[SIBUPRBYBPROM, Tyumen', USSR] The appearance of additional rings on the scales of the pelyad and the broad whitefish introduced into bodies of water to the south of their range, is connected with cessation of feeding of the fish when the water is at its hottest in July (above 24°). The number of sclerites formed in one year differs in the pelyad and the broad whitefish (there are 8-16 fewer in the pelyad than in the broad whitefish). Specific data on the number of sclerites forming in one year on the scales of the pelyad and the broad whitefish enable the real age of the fish investigated to be more accurately determined.--Concl.

PHYSIOLOGY

77-000918 Abramowitz, J.; Horn, K. V.; Chavin, W. EFFECT OF ENVIRONMENTAL TEMPERATURE UPON RATES AND DURATION OF HEMOLYSIS OF SQUALIFORM ERYTHROCYTES. Comp. Biochem. Physiol. A Comp. Physiol. 57 (2): 229-230. 1977. SFA 22(3)
[Dep. Biol., Wayne State Univ., Detroit, MI 48202]

77-000919 Adams, L. W. TRITIUM KINETICS IN A FRESHWATER MARSH ECOSYSTEM. Ph.D dissertation, Ohio State Univ. 138p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(11), 1977. SFA 22(3)

77-000920 Adelman, I. P. EFFECTS OF BOVINE GROWTH HORMONE ON GROWTH OF CARP (/CYPRINUS CARPIO/) AND THE INFLUENCES OF TEMPERATURE AND PHOTOPERIOD. J. Fish. Res. Board Can. 34 (4): 509-515. Apr. 1977. In English with French summ. SFA 22(3)
[Dep. Entomol. Fish Wildl., Univ. Minn., St. Paul 55108]

77-000921 Al-Hamed, M. I. SALINITY TOLERANCE OF COMMON CARP (/CYPRINUS CARPIO/, L.). Bull. Iraq Nat. Hist. Mus. (Univ. Baghdad) 5 (1): 1-7. May 1971. In English with Arabic summ. SFA 22(3)

[Div. Hydrobiol. Fish., Minist. Agric., Baghdad, Iraq] Common carp, /Cyprinus carpio/, ranging in length from 8.5 to 12.7 centimetres were exposed directly and gradually to different salinity levels. In direct exposure experiments, fish lived at salinities as high as 12 ‰ for ten weeks (the duration of the experiment), and higher salinities proved to be unfavourable. In gradual acclimatization experiment (acclimatization period of 4 days), fish lived at salinities as high as 17 ‰, but higher levels proved to be lethal. Fertilized ova of carp hatched at salinities from 2 ‰ to 10 ‰, but the favourable level was up to 6.6 ‰.--Summ.

77-000922 Allen, D. M. MEASUREMENTS OF SERUM THYROXINE AND THE PROPORTIONS OF RHODOPSIN AND PORPHYROPSIN IN RAINBOW TROUT. Can. J. Zool. 55 (5): 836-842. May 1977. In English with French summ. SFA 22(3)

[Dep. Biol., Univ. Oreg., Eugene 974031]

77-000923 Amsticlavskii, A. Z. DIURNAL RHYTHM OF MITOSES IN THE CORNEAL EPITHELIUM OF /PHOXINUS PERCNUROS/ UNDER NATURAL CONDITIONS. Sov. J. Ecol. (Engl. Transl. Ekologiya) 7 (3): 279-281. May-June 1976. SFA 22(3)

[Urals Sci. Cent., Acad. Sci., Salekhard, USSR]

77-000924 Bannister, J. V.; Anastasi, A.; Bannister, W. H. CYTOSOL SUPEROXIDE DISMUTASE FROM SWORDFISH (/XIPHIAS GLADIUS/ L.) LIVER. Comp. Biochem. Physiol. B Comp. Biochem. 56 (3): 235-238. 1977. SFA 22(3)

[Dep. Physiol. Biochem., Royal Univ. Malta, Msida, Malta]

77-000925 Baron, V. D.; Mikhailenko, N. A. /URANOSCOPUS SCABER/: A TRANSITIONAL FORM IN THE EVOLUTION OF ELECTRIC ORGANS IN FISH. Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.) 229 (1-6): 290-293. July-Aug. 1976. SFA 22(3)

77-000926 Becker, C. D.; Genoway, R. G.; Schneider, M. J. COMPARATIVE COLD RESISTANCE OF THREE COLUMBIA RIVER ORGANISMS. Trans. Am. Fish. Soc. 106 (2): 178-184. Mar. 1977. SFA 22(3)

[Ecosystems Dep., Battelle Mem. Inst., Richland, WA 993521]

77-000927 Belghaug, P.; Doving, K. B. ODOUR THRESHOLD DETERMINED BY STUDIES OF THE INDUCED WAVES IN THE OLFACTORY BULB OF THE CHAR (/SALMO ALPINUS/ L.). Comp. Biochem. Physiol. A Comp. Physiol. 57 (3): 327-330. 1977. SFA 22(3)

[Inst. Zoophysiol., Univ. Oslo, Box 1051, Blindern, Oslo 3, Norway] The induced waves recorded at the surface of the olfactory bulb of the char (/Salmo alpinus/ L.) was studied when stimulating the olfactory epithelium with different odours. The lowest concentration eliciting a response in the bulb was determined for 28 substances. Asparagine had the lowest threshold with a mean concentration of 2.5×10^{-6} M. The carbohydrates and carboxylic acids studied were less potent than alpha-amino acids.

77-000928 Belova, A. V. DYNAMICS OF ASEPTIC INFLAMMATION IN THE THYMUS OF FISHES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 112-119. 1976. SFA 22(3)

[Murmansk Mar. Biol. Inst., Dal'niye, Zelentsy, USSR] The reactivity of the thymus of underyearling and second-year Atlantic salmon /*Salmo salar*/ when this organ is directly stimulated, was studied. An analysis was made of changes in cells and tissues and of regeneration. An immunological response of the thymus was demonstrated.

77-000929 Bettinger, T. L.; Thommes, M. M.; Spigarelli, S. A. RELATIVE ROLES OF CONDUCTION AND CONVECTION IN THE BODY TEMPERATURE CHANGE OF GIZZARD SHAD, /*Dorosoma cepedianum*/. Comp. Biochem. Physiol. A Comp. Physiol. 57 (2): 275-279. 1977. SFA 22(3)

[Dep. Biol., N. Tex. State Univ., Denton 762031]

77-000930 Billard, R. VARIATION DE LA QUALITE DES GAMETES A DIFFERENTS NEVEAUX DU TRACTUS GENITAL CHEZ LA TROITE ARC-EN-CIEL. [VARIATION IN THE QUALITY OF SPERM AND OVA AT VARIOUS DISTANCES ALONG THE GENITAL TRACT OF THE RAINBOW TROUT.] Ann. Hydrobiol. 7 (2): 97-104. 1976. In French with English summ. SFA 22(3)

[Lab. Physiol. Poissons, Cent. Natl. Rech. Zootech., I.N.R.A., 78350 Jouy en Josas, France]

77-000931 Bird, D. J.; Lutz, P. L.; Potter, I. C. OXYGEN DISSOCIATION CURVES OF THE BLOOD OF LARVAL AND ADULT LAMPREYS (/LAMPETRA FLUVIATILIS/). J. Exp. Biol. 65 (2): 449-458. Oct. 1976. SFA 22(3)

[Sch. Environ. Life Sci., Murdoch Univ., Murdoch, Western Australia 6153]

77-000932 Blaxter, J. H. S.; Denton, F. J. FUNCTION OF THE SWIMBLADDER-INNER EAR-LATERAL LINE SYSTEM OF HEPPING IN THE YOUNG STAGES. J. Mar. Biol. Assoc. U. K. 56 (2): 487-502. May 1976. SFA 22(3)

[Dunstaffnage Mar. Res. Lab., Oban, Argyll, Scotland]

77-000933 Bloom, H. D. A SEXUAL AGGREGATING PHEROMONE SYSTEM IN THE ZEBRAFISH, /BRACHYDANIO RERIO/, (HAMILTON-BUCHANAN). Ph.D. dissertation, New York Univ. 86 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

77-000934 Bloom, H. D.; Perlmutter, A. A SEXUAL AGGREGATING PHEROMONE SYSTEM IN THE ZEBRAFISH, /BRACHYDANIO RERIO/ (HAMILTON-BUCHANAN). J. Exp. Zool. 199 (2): 215-226. Feb. 1977. SFA 22(3)

[Dep. Biol., N.Y. Univ., New York, NY 10003] Zebrafish, /*Brachydanio rerio*/, when placed in a T-maze demonstrated preference for, or avoidance of, donor water produced when specified numbers of conspecifics of either sex were kept in holding systems for specific lengths of time. Inter- and intrasexual attractions were found to occur in different ranges of concentration of the attractant material(s). Insufficient or excessive concentrations of the attractant(s) failed to elicit the attractant response. The proposed pheromone attractant was shown to be removable from the aquatic environment. Its possible role in the behavioral aspects of schooling and spawning is discussed.

SPORT FISHERY ABSTRACTS

77-000935 Bols, N. C.; Kasinsky, H. E. ON THE DIVERSITY OF SPERM HISTONES IN THE VERTEBRATES: II. A CYTOCHEMICAL STUDY OF THE BASIC PROTEIN TRANSITIONS DURING SPERMIOGENESIS IN THE CARTILAGINOUS FISH /HYDROLAGUS COLLIERI/. J. Exp. Zool. 198 (1): 109-114. Oct. 1976. SFA 22(3)

[Med. Nobel Inst., Karolinska Inst., 104 01 Stockholm 60, Sweden]

77-000936 Bondar, R. L. NEUROFIBRILLAR AND NEUROFILAMENTOUS CHANGES IN GOLDFISH (/CARASSIUS AURATUS/ L.) IN RELATION TO TEMPERATURE. Ph.D. dissertation, Univ. Toronto (Canada). 1974. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

77-000937 Bone, O. MAINTENANCE NEURONS IN ELASTOBRANCHS. J. Mar. Biol. Assoc. U. K. 57 (1): 253-259. Feb. 1977. SFA 22(3)

[Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

77-000938 Boulekbache, H.; Poubaud, P.; Devillers, C.; Joly, C. LOCALISATION HISTOCHIMIQUE DE LA LACTICODESHYDROGENASE DANS L'EMBRYON DE LA TRUITE (/SALMO IRIDEUS/, GIBB), AU COURS DE L'ORGANOGENESE PRECOCE DE LA CORDE ET DU TUBE NEURAL. [THE HISTOCHEMICAL LOCALIZATION OF THE LACTATE DEHYDROGENASE IN THE TROUT EMBRYO (/SALMO IRIDEUS/, GIBB) DURING THE EARLY ORGANOGENESIS OF THE NOTOCHORD AND THE NEURAL TUBE.] C. P. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 284 (5): 381-384. 31 Jan. 1977. In French with English summ. SFA 22(3)

77-000939 Boyd, T. A.; Cha, C.-J.; Forster, R. P.; Goldstein, L. FREE AMINO ACIDS IN TISSUES OF THE SKATE /RAJA EPINACEA/ AND THE STINGRAY /DASYATIS SABINA/: EFFECTS OF ENVIRONMENTAL DILUTION. J. Exp. Zool. 199 (3): 435-442. Mar. 1977. SFA 22(3)

[Div. Biol. Med. Sci., Brown Univ., Providence, RI 02912]

77-000940 Brame, J. C.; Stalnaker, C. B.; Farley, T. M.; Klar, G. T. STARCH GEL ELECTROPHORESIS OF RAINBOW TROUT, SALMO GARDNERI/, AND CUTTHROAT TROUT, /SALMO CLARKII/, HEMOGLOBINS. Comp. Biochem. Physiol. B Comp. Biochem. 56 (4): 435-437. 1977. SFA 22(3)

[Dep. Wildl. Sci., Utah State Univ., Logan 84322]

77-000941 Cala, P. M. VOLUME REGULATION BY FLOUNDER RED BLOOD CELLS: THE ROLE OF THE MEMBRANE POTENTIAL. J. Exp. Zool. 199 (3): 339-344. Mar. 1977. SFA 22(3)

[Dep. Human Physiol., Sch. Med., Univ. Calif., Davis 95616]

77-000942 Carrier, J. C.; Evans, D. H. THE ROLE OF ENVIRONMENTAL CALCIUM IN FRESHWATER SURVIVAL OF THE MARINE TELEOST, /LAGODON RHOMBOIDES/. J. Exp. Biol. 65 (3): 529-538. Dec. 1976. SFA 22(3)

[Dep. Biol., Univ. Miami, Coral Gables, FL 33124] The marine teleost fish, /Lagodon rhomboides/, can only tolerate fresh water (5 mM Na) if Ca is also present (10 mM). Transfer to Ca-free fresh water is followed by a substantial increase in radioactive Na efflux with little or no change in the transepithelial potential. Addition of the chelating agent EDTA (2 mM) further increases Na efflux. Fish left in Ca-free fresh water for 2.5 h die with a total body Na less than 50 percent of that found in animals acclimated to Ca-supplemented fresh water. Rates of Na uptake were measured on either sea-water-acclimated

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or Ca-supplemented fresh water-acclimated fish transferred to various low Na media. In both cases Na uptake has a high K_m , is saturable, inhibited by external NH_4^+ , H and amiloride, and is not related to changes in the transepithelial potential. It is suggested that $/L. rhomboides/$ is dependent upon external Ca to decrease diffusional Na loss in low salinities so that a relatively inefficient Na uptake can balance diffusional and urinary Na loss.

77-000943 Casillas, E.; Smith, L. S. EFFECT OF STRESS ON BLOOD COAGULATION AND HAEMATOLOGY IN RAINBOW TROUT (*/SALMO GAIRDNERI/*). J. Fish Biol. 10 (5): 481-491. May 1977. SFA 22(3)

[Univ. Wash. Fish. Res. Inst., Seattle 98195] The effect of short-term stress on blood clotting times, cell counts, haematocrits, and blood glucose levels was studied in a hatchery strain and wild type rainbow trout, */Salmo gairdneri/*. Blood clotting times declined and thrombocyte counts, haematocrits, and blood glucose levels increased after stress in both strains of trout. The wild type of rainbow trout, however, required less time to recover from the stress than the hatchery strain of rainbow trout. The implications of stress activated blood coagulation system in fish are discussed.

77-000944 Cech, J. J., Jr.; Powell, D. M.; Glasgow, J. S. CARDIOVASCULAR RESPONSES OF THE WINTER FLOUNDER */PSEUDOPLEURONECTES AMERICANUS/* TO HYPOXIA. Comp. Biochem. Physiol. A Comp. Physiol. 57 (1): 123-125. 1977. SFA 22(3)

[Wildl. Fish. Biol., Univ. Calif., Davis 95616]

77-000945 Chan, D. K. O.; Wong, T. M. PHYSIOLOGICAL ADJUSTMENTS TO DILUTION OF THE EXTERNAL MEDIUM IN THE LIP-SHARK, */HEMISCYLLIUM PLAGIOSUM/* (BENNETT). III. OXYGEN CONSUMPTION AND METABOLIC RATES. J. Exp. Zool. 200 (1): 97-102. Apr. 1977. SFA 22(3)

[Dep. Zool., Univ. Hong Kong, Hong Kong]

77-000946 Chan, D. K. O.; Wong, T. M. PHYSIOLOGICAL ADJUSTMENTS TO DILUTION OF THE EXTERNAL MEDIUM IN THE LIP-SHARK */HEMISCYLLIUM PLAGIOSUM/* (BENNETT). I. SIZE OF BODY COMPARTMENTS AND OSMOLYTE COMPOSITION. J. Exp. Zool. 200 (1): 71-84. Apr. 1977. SFA 22(3)

[Dep. Zool., Univ. Hong Kong, Hong Kong]

77-000947 Cherry, D. S.; Dickson, K. L.; Cairns, J., Jr.; Stauffer, J. R. PREFERRED, AVOIDED, AND LETHAL TEMPERATURES OF FISH DURING RISING TEMPERATURE CONDITIONS. J. Fish. Res. Board Can. 34 (2): 239-246. Feb. 1977. In English with French summ. SFA 22(3)

[Biol. Dep. Cent. Environ. Stud., VPI & SU, Blacksburg, VA 24061]

77-000948 Coburn, C. B., Jr. RED BLOOD CELL HEMATOLOGY OF FISHES: A CRITIQUE OF TECHNIQUES AND A COMPILATION OF PUBLISHED DATA. J. Mar. Sci. 2 (2): 37-58. 1973. SFA 22(3)

A survey and critique of methods for red blood cell counts, hematocrit, hemoglobin concentration, and erythrocyte size used in fish hematology are presented. The available data for red blood cell counts, hematocrit, hemoglobin concentration, erythrocyte dimensions, and nuclear dimensions are tabulated from 58 papers.

- 77-000949 Cohen, D. M. SWIMMING PERFORMANCE OF THE GADOID FISH /ANTIMORA ROSTRATA/ AT 2400 METERS. Deep-Sea Res. 24 (3): 275-277. Mar. 1977. SFA 22(3)
[NMFS, Natl. Mus. Nat. Hist., Washington, D.C. 20560] A 27-cm /Antimora rostrata/ photographed from a submersible at 2400 m swam at a speed of 39.2 cm s^{-1} . Swimming power was calculated as $3.6 \times 10^5 \text{ erg s}^{-1}$, nearly the same as that of a rainbow trout of similar size.
- 77-000950 Colin, D. REPONSES HEMODYNAMIQUES DE LA BRANCHE A L'ADENOSINE CHEZ LA TRUITE (/SALMO GAIARDNERI/). ETUDE SUR TETE ISOLEE PERFUSEE. [HEMODYNAMIC RESPONSES OF TROUT (/SALMO GAIARDNERI/) GILL TO ADENOSINE. STUDY WITH ISOLATED PERFUSED HEAD.] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 284 (13): 1191-1194. 28 Mar. 1977. In French with English summ. SFA 22(3)
- 77-000951 Conte, F. P. MOLECULAR ASPECTS OF CHLORIDE CELL FORMATION IN /ONCORHYNCHUS/. II. ISOLATION AND CHARACTERIZATION OF GILL TRANSFER PNA'S DURING ACTIVE SALT SECRETION. J. Exp. Zool. 199 (3): 395-402. Mar. 1977. SFA 22(3)
[Dep. Zool., Oreg. State Univ., Corvallis 97331]
- 77-000952 Criswell, D.; Norton, V. M.; Davis, K. B. THE EFFECT OF ENVIRONMENTAL CALCIUM ON THE REGULATION OF PLASMA SODIUM AND CHLORIDE IN CHANNEL CATFISH. J. Tenn. Acad. Sci. 52 (2): 73. Apr. 1977. SFA 22(3)
[Memphis State Univ., Memphis, TN] Abstract only.
- 77-000953 Dabrowska, P.; Szpacenko, A. COMPARISON OF THE COMPOSITION AND PROPERTIES OF NATURAL ACTOMYOSIN FROM CAPP (/CYPRINUS CARPIO/) AND RABBIT SKELETAL MUSCLE. Comp. Biochem. Physiol. B Comp. Biochem. 56 (2): 139-142. 1977. SFA 22(3)
[Dep. Biochem. Nervous System Muscle, Nencki Inst. Exp. Biol., 3 Pasteur Str., 12-093 Warsaw, Poland]
- 77-000954 Davies, P. M. C.; Massey, S. M. ENERGY CONVERSION EFFICIENCY IN FISH: THE INFLUENCE OF FOOD INTAKE AND TEMPERATURE ON K-LINES AT RATIOS CLOSE TO MAINTENANCE. J. Comp. Physiol. B Metab. Transp. Funct. 114 (2): 191-202. 1977. SFA 22(3)
[Dep. Zool., Univ. Nottingham, Nottingham NG7 2RD, England] Data relating to growth in goldfish at ration levels very close to maintenance are used to calculate maintenance rations and food conversion efficiencies (K) in energetic terms. The relationship between maintenance metabolism and temperature is logarithmic, with a Q(10) of 2.2 (12-28°C). A significant positive relationship is apparent between $\ln K$ and ration on which the influence of temperature is equivocal. The meaning of this in relation to the findings of other workers is discussed.
- 77-000955 Davis, K. B.; Goudie, C. A. EFFECT OF TEMPERATURE AND SALINITY ON MUSCLE CHLORIDE AND WATER DISTRIBUTION IN CHANNEL CATFISH, /ICTALURUS PUNCTATUS/. J. Tenn. Acad. Sci. 52 (2): 73. Apr. 1977. SFA 22(3)
[Memphis State Univ., Memphis, TN] Abstract only.

77-000956 de Vlaming, V. L.; Shing, J.; Paquette, G.; Vuchs, R. /IN VIVO/ AND /IN VITRO/ EFFECTS OF OESTRADIOL-17BETA ON LIPID METABOLISM IN /NOTEMIGONUS CRYSOLEUCAS/. J. Fish Biol. 10 (3): 273-285. Mar. 1977. SFA 22(3)

[Dep. Biol., Marquette Univ., Milwaukee, WI 53233] The effects of oestradiol-17beta on the gonosomatic index, liver size, hepatic and body lipid levels in the cyprinid teleost, /Notemigonus crysoleucas/, were investigated. Administration of oestradiol to female /N. crysoleucas/ during the gonadal preparatory and pre spawning seasons stimulates increases in ovarian size. During the early spawning season oestradiol therapy results in a reduction of ovarian gonosomatic index. Oestrogen treatment of males causes a suppression of testicular growth. In female fish exposed to long (15.5L/8.5D) or intermediate (12L/12D) photoperiods oestradiol increases body fat reserves. At short photoperiods (9L/15D) oestrogen treatment of females results in body fat store depletion. Low doses deplete and high doses of oestradiol increase body lipid reserves in male fish. The hepatosomic index increases in both male and female fish following oestrogen treatment. Oestradiol therapy during the gonadal preparatory season, but not during the pre-spawning season, increases total liver lipids. The /In vitro/ effects of oestradiol on liver lipid and carbohydrate metabolism were also examined. Under the conditions used in these experiments, lipid depletion was observed in liver slices incubated with or without oestradiol. Pretreatment of fish with oestradiol before liver tissue was removed drastically reduced /in vitro/ lipid depletion. Oestradiol retards the gluconeogenesis and glycogenesis seen in liver slices incubated in a hormone-free medium.

77-000957 de Vlaming, V. L.; Vodicnik, M. J. DIURNAL VARIATIONS IN PITUITARY GONADOTROPIN CONTENT AND IN GONADAL RESPONSE TO EXOGENOUS GONADOTROPIN AND PROLACTIN IN /NOTEMIGONUS CRYSOLEUCAS/. J. Fish Biol. 10 (4): 371-383. Apr. 1977. SFA 22(3)

[Dep. Biol., Marquette Univ., Milwaukee, WI 53233] Diurnal variations in pituitary gonadotropin content were determined in the golden shiner, /Notemigonus crysoleucas/. In fish maintained on a 15.5L/8.5D-15°C regime, a pronounced circadian variation in pituitary gonadotropin potency was observed, the gonadotropin content being minimal early and maximal late during the light phase. Little temporal variation was seen in fish exposed to a 9L/15D-15°C regime. The effects of gonadotropin and prolactin treatment on gonadal activity in /N. crysoleucas/ were also investigated. Salmon gonadotropin was effective in stimulating an increased rate of gonadal development when given early during the light phase in fish maintained on a 15.5L/8.5D-15°C regime; injections of gonadotropin given late in the light phase failed to accelerate gonadal growth. Regardless of time of injection, ovine luteinizing hormone accelerated gonadal growth in fish maintained on a 9L/15D-15°C regime. Ovine prolactin retarded gonadal development in fish exposed to a 15.5L/8.5D-24°C regime, independent of injection time. In fish maintained on a 15.5L/8.5D-15°C regime, injections of prolactin given early, but not late, during the light phase repressed gonadal maturation. These data show that under certain photoperiod-temperature conditions there is a temporal aspect to responsiveness to exogenous hormone treatment.

77-000958 de Vlaming, V. L.; Vodicnik, M. J. EFFECTS OF PINEALECTOMY ON PITUITARY GONATOTROPHS, PITUITARY GONADOTROPHIN POTENCY AND HYPOTHALAMIC GONADOTROPIN RELEASING ACTIVITY IN /NOTEMIGONUS CRYSOLEUCAS/. J. Fish Biol. 10 (1): 73-86. Jan. 1977. SFA 22(3)

[Dep. Biol., Marquette Univ., Milwaukee, WI 53233]

77-000959 Dickhoff, W. W.; Gorbman, A. /IN VITRO/ THYROTROPIC EFFECT OF THE PITUITARY OF THE PACIFIC HAGFISH, /EPTATRETUS STOUTI/. Gen. Comp. Endocrinol. 31 (1): 75-79. Jan. 1977. SFA 22(3)

[Dep. Zool., Univ. Wash., Seattle 98195]

77-000960 Dobson, S.; Dodd, J. M. ENDOCRINE CONTROL OF THE TESTIS IN THE DOGFISH /SCYLIORHINUS CANICULA/ L. II. HISTOLOGICAL AND ULTRASTRUCTURAL CHANGES IN THE TESTIS AFTER PARTIAL HYPOPHYSECTOMY (VENTRAL LOBECTOMY). Gen. Comp. Endocrinol. 32 (1): 53-71. May 1977. SFA 22(3)

[Dep. Zool., Univ. Coll. North Wales, Bangor, Gwynedd LL57 2UW, United Kingdom]

77-000961 Dobson, S.; Dodd, J. M. ENDOCRINE CONTROL OF THE TESTIS IN THE DOGFISH /SCYLIORHINUS CANICULA/ L. I. EFFECTS OF PARTIAL HYPOPHYSECTOMY ON GRAVIMETRIC, HORMONAL AND BIOCHEMICAL ASPECTS OF TESTIS FUNCTION. Gen. Comp. Endocrinol. 32 (1): 41-52. May 1977. SFA 22(3)

[Dep. Zool., Univ. Coll. North Wales, Bangor, Gwynedd LL57 2UW, United Kingdom]

77-000962 Dobson, S.; Dodd, J. M. THE ROLFS OF TEMPERATURE AND PHOTOPERIOD IN THE RESPONSE OF THE TESTIS OF THE DOGFISH, /SCYLIORHINUS CANICULA/ L. TO PARTIAL HYPOPHYSECTOMY (VENTRAL LOBECTOMY). Gen. Comp. Endocrinol. 32 (1): 114-115. May 1977. SFA 22(3)

[Dep. Zool., Univ. Coll. North Wales, Bangor, Gwynedd LL57 2UW, United Kingdom]

77-000963 Dolinin, V. A. THE REGULATORY MECHANISM OF THE RESPIRATORY RHYTHM IN FISH. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 176-178. 1976. SFA 22(3)

[Inst. Physiol., Acad. Sci., Novosibirsk, USSR]

77-000964 Doving, K. B.; Belghaug, R. FREQUENCY OF INDUCED WAVES IN THE OLFACTORY BULB IN CHAR (/SALMO ALPINUS/ L.); A TEMPERATURE DEPENDENCE. Comp. Biochem. Physiol. A Comp. Physiol. 56 (4): 577-579. 1977. SFA 22(3)

[Inst. Zoophysiol., Univ. Oslo, Blindern, Oslo 3, Norway]

77-000965 Doyle, W. L. CYTOLOGICAL CHANGES IN CHLORIDE CELLS FOLLOWING ALTERED IONIC MEDIA. J. Exp. Zool. 199 (3): 427-434. Mar. 1977. SFA 22(3)

[Dep. Anat., Univ. Chicago, Chicago, IL 60637]

77-000966 Eales, J. G. USE OF THYROXINE- AND TRIIODOTHYRONINE-SPECIFIC ANTIBODIES TO STUDY THYROXINE KINETICS IN RAINBOW TROUT, /SALMO GAIARDNERI/. Gen. Comp. Endocrinol. 32 (1): 89-98. May 1977. SFA 22(3)

[Dep. Zool., Univ. Manitoba, Winnipeg, MF R3T 2N2, Canada]

77-000967 Eaton, R. C. THE MAUTHNER NEURON SYSTEM IN EMBRYOS AND LARVAE OF THE ZEBRAFISH, /BRACHYDANIO RERIO/ (HAMILTON-BUCHANAN): A NEW PREPARATION FOR STUDIES IN DEVELOPMENTAL NEUROBIOLOGY. Ph.D. dissertation, Univ. Calif. (Riverside) 121 p. 1974. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

77-000968 Eddy, F. B.; Lomholt, J. P.; Weber, R. F.; Johansen, K. BLOOD RESPIRATORY PROPERTIES OF RAINBOW TROUT (/SALMO GAIARDNERI/) KEPT IN WATER OF HIGH CO(2) TENSION. J. Exp. Biol. 67: 37-47. Apr. 1977. SFA 22(3)

[Dep. Biol. Sci., Dundee Univ., Dundee DD1 4HN, Scotland]

77-000969 Eddy, F. B. OXYGEN UPTAKE BY RAINBOW TROUT BLOOD, /SALMO GAIARDNERI/. J. Fish Biol. 10 (1): 87-90. Jan. 1977. SFA 22(3)

[Dep. Biol. Sci., Dundee Univ., Dundee DD1 4HN, Scotland] Oxygen uptake by rainbow trout red cells was measured in the temperature range 5° to 40°C. Between 5° and 20°C there was a steady increase in rate and at 20°C a maximum rate of 2.5 ul O(2)/min/ml red blood cells occurred, followed by a decline in the rate as the temperature increased. A morphological investigation of the red cell was conducted and possible functions of the nucleus in fish red blood cells are discussed.

77-000970 Elliott, J. M. BODY COMPOSITION OF BROWN TROUT (/SALMO TRUTTA/ L.) IN RELATION TO TEMPERATURE AND RATION SIZE. J. Anim. Ecol. 45 (1): 273-289. Feb. 1976. SFA 22(3)

[Freshwater Biol. Assoc., Windermere Lab., Ambleside, Cumbria, England]

77-000971 Elliott, J. M. THE ENERGETICS OF FEEDING, METABOLISM AND GROWTH OF BROWN TROUT (SALMO TRUTTA/ L.) IN RELATION TO BODY WEIGHT, WATER TEMPERATURE AND RATION SIZE. J. Anim. Ecol. 45 (3): 923-946. Oct. 1976. SFA 22(3)

[Freshwater Biol. Assoc., Windermere Lab., Ambleside, Cumbria, England] Energy budgets were calculated for brown trout (live weight 5-281 g) fed on various ration sizes ranging from zero to maximum rations at different water temperatures (range 3.8-21.7°C). Both the weight of the trout and the water temperature affected the five components of the energy budget: daily intake, losses in faeces and excretory products, change in total energy content of the fish, metabolism. Equations were developed to estimate these components for trout on maximum rations. Of the three components of metabolism, the energy required for activity and for the apparent specific dynamic action could not be separated, but the energy required for standard metabolism was estimated from equations developed from the data for trout on zero rations. The gross efficiency of energy utilization exceeded 33 percent in a narrow zone of energy intake and a temperature range of 8-11 °C. It then decreased with both increasing and decreasing temperature, energy intake and change in the total energy content of the trout. Equations were developed to estimate the optimum energy intake.--From summ.

SPORT FISHERY ABSTRACTS

77-000972 Elliott, J. M. ENERGY LOSSES IN THE WASTE PRODUCTS OF BROWN TROUT (*/SALMO TRUTTA/* L.). *J. Anim. Ecol.* 45 (2): 561-580. June 1976. SFA 22(3)

[Freshwater Biol. Assoc., Windermere Lab., Ambleside, Cumbria, England] Energy losses in the waste products of brown trout (live weight 10-302 g) were measured for single fish fed on various ration sizes ranging from zero to maximum rations at different water temperatures (range 3.8-20.4°C). The proportion of the daily energy intake lost in the faeces decreased as temperature increased and the ration level decreased. Absorption efficiency increased with a decreasing level of energy intake and increasing temperature, but the temperature effect was less marked above about 15°C. The proportion of the energy intake lost in the excretory products, ammonia and urea, increased as temperature increased and the ration level decreased. The proportion of the energy intake lost in both faeces and excretory products was less variable than its two components, and energy available for growth and metabolism increased as the ration level decreased, slightly increased with increasing temperature at low temperatures and then slightly decreased with increasing temperature at high temperatures. The energy losses in the waste products of trout deprived of food increased with both body weight and temperature. Equations were developed to estimate the proportion of the daily energy intake lost in the faeces, lost in the excretory products, absorbed by the trout, and available for growth and metabolism. They are applicable to trout in the weight range 10-300 g at temperatures between 3.8°C and 20.4°C.--From summ.

77-000973 Evans, P. E.; Hara, T. J. HISTOCHEMICAL LOCALIZATION OF PHOSPHOLIPIDS IN THE OLFACTORY EPITHELIUM OF FISH. *Can. J. Zool.* 55 (5): 776-781. May 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

77-000974 Farmer, S. W.; Papkoff, H.; Bewley, T. A.; Hayashida, T.; Nishioka, R. S.; Bern, H. A.; Li, C. H. ISOLATION AND PROPERTIES OF TELEOST PROLACTIN. *Gen. Comp. Endocrinol.* 31 (1): 60-71. Jan. 1977. SFA 22(3)

[Hormone Res. Lab., Univ. Calif., San Francisco 94143]

77-000975 Fay, R. P.; Olsho, L. RESPONSE PATTERNS OF NEURONS IN THE LAGENAR BRANCH OF THE GOLDFISH AUDITORY NERVE. *J. Acoust. Soc. Am.* 61 (Suppl. 1): 59. 1977. SFA 22(3)

[Dep. Psychol., Loyola Univ., Chicago, IL 60626] Abstract only.

77-000976 Feng, A. S.; Bullock, T. H. NEURONAL MECHANISMS FOR OBJECT DISCRIMINATION IN THE WEAKLY ELECTRIC FISH */EIGENMANNJA VIRESCENS/*. *J. Exp. Biol.* 66: 141-158. Feb. 1977. SFA 22(3)

[Scripps Inst. Oceanogr., La Jolla, CA 92093]

77-000977 Fickeisen, D. H.; Brown, G. W., Jr. D-AMINO ACID OXIDASE IN VARIOUS FISHES. *J. Fish Biol.* 10 (5): 457-465. May 1977. SFA 22(3)

[Ecosystems Dep., Battelle Northwest, P.O. Box 999, Richland, WA 99352] A systematic procedure is provided for determination of D-amino acid oxidase (EC 1.4.3.3) activity in fish tissues. Activity was surveyed in crude liver homogenates of twenty-three species of fish. Activity ranged from 0.47 to 3.12 units (umol product produced per min) per gram wet weight of tissue. Activity was highest in liver,

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with significant levels occurring in kidney and pyloric caecae. It was below the limit of detection in brain, heart, spleen, testis, gill filaments, and muscle. Some properties of the enzyme from sockeye salmon, *Oncorhynchus nerka* (Walbaum), were studied. Knowledge of occurrence and levels of D-amino acid oxidase in fish may be useful to fish aquaculturists contemplating supplementation of feed with racemic mixtures of amino acids.

77-000978 Flegler, C. ELECTRON MICROSCOPIC STUDIES ON THE DEVELOPMENT OF THE CHORION OF THE VIVIPAROUS TELEOST *DEPMOGENYS PUSILLUS* (HEMIRHAMPHIDAE). Cell Tissue Res. 179 (2): 255-270. 1977. SFA 22(3)

[Abt. Anat., Med. Fak. RWTH Aachen, Melatener St. 211, D-5100 Aachen, West Germany]

77-000979 Flerova, G. I.; Gdovskiy, P. A. THE RATE OF PROPAGATION OF A STIMULUS THROUGH THE OLFACTORY NERVE FIBERS AND THE RESPONSES ELICITED IN THE RHINENCEPHALON OF FISHES UNDER CHANGING TEMPERATURE CONDITIONS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 106-112. 1976. SFA 22(3)

[Acad. Sci., Borok, USSR] In perch acclimated to a temperature of 13-14°, the form of the responses elicited from the olfactory bulb is most profuse and well reproduced at a temperature several degrees lower than the acclimation temperature. A reduction in the temperature at first assists the separation and prolongation of the oscillations of the potential which constitute the response, and it then blocks the individual oscillations, as a result of which the response is simplified and shortened. The conducting of the action potential through the fibers of the olfactory nerve continues to be maintained at a temperature decrease up to 0.4°. With an increase in temperature, the form of the response elicited is simplified, its duration is curtailed and the oscillations of the potential, constituting the response (with the exception of the action potential of the olfactory nerve), disappear at a brain temperature of 24°. At an increase in temperature of 5 to 25° the speed of propagation of the action potential through the fibers of the olfactory nerve increases from 0.07 to 0.32 m/sec. In the middle temperature range the coefficient $Q(10)$ is close to 2.--Concl.

77-000980 Fletcher, G. L. CIRCAANNUAL CYCLES OF BLOOD PLASMA FREEZING POINT AND NA AND CL CONCENTRATIONS IN NEWFOUNDLAND WINTER FLOUNDER (*PSEUDOPLEURONectes AMERICANUS*): CORRELATION WITH WATER TEMPERATURE AND PHOTOPERIOD. Can. J. Zool. 55 (5): 789-795. May 1977. In English with French summ. SFA 22(3)

[Mar. Sci. Pes. Lab., Memorial Univ. Newfoundland, St. John's, NF, Canada]

77-000981 Frankel, J. S. LACTATE, SUPERNATANT MALATE AND ALCOHOL DEHYDROGENASE CHARACTERIZATION AND ONTOGENY IN THE TELEOST GENUS *BRACHYDANIO*. Ph.D. dissertation, Rutgers Univ. 167 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

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77-000982 Gardiner, D. M. INTRAOVARIAN STORAGE OF SPERMATOZOA IN THE VIVIPAROUS TELEOST /CYMATOGASTER AGGREGATA/ GIBBONS (PERCIFORMES: EMBIOTOCIDAE). Ph.D. dissertation, Univ. Calif. (San Diego) 127 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-000983 Geraudie, J.: Singer, M. RELATION BETWEEN NERVE FIBER NUMBER AND PECTORAL FIN REGENERATION IN THE TELEOST. J. Exp. Zool. 199 (1): 1-8. Jan. 1977. SFA 22(3)
[Sch. Med., Case West. Reserve Univ., Cleveland, OH 44106]

77-000984 Glazova, T. M. PHYSIOLOGICAL AND BIOCHEMICAL BLOOD CHARACTERISTICS OF SOME SPECIES OF TROPICAL FISH FROM THE PACIFIC OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 95-105. 1976. SFA 22(3)

[IEMFZh, Moscow, USSR] In two species of sharks and 35 species of bony fishes from the tropical zone of the Pacific Ocean the hemoglobin concentration in the blood, the number of erythrocytes, the specific weight, the hematocrit and the diameters of the erythrocytes were measured and the hemoglobin saturation of one erythrocyte, the mean cellular hemoglobin concentration and erythrocyte volume were calculated. The maximum values of these indicators were recorded in flyingfish, Carangidae and snake mackerels. Consideration is given to the influence of the activity of a fish on its blood indicators, the magnitude of which depends more on the ecology than on the systematic position of the fish. Sharp differences in blood indicators have been found between elasmobranchs and teleosts. The data submitted have been obtained for the first time for the species investigated.

77-000985 Goetz, F. W., Jr.; Hoffman, P. A.; Pancoe, W. L. A SURGICAL OPERATING APPARATUS FOR FISH AND ITS USE IN THE PINALECTOMY OF SALMONIDS. J. Fish Biol. 10 (3): 287-290. Mar. 1977. SFA 22(3)

[W. L. Pancoe: Dep. Zool. Physiol, Univ. Wyo., Laramie 82071] A surgical operating apparatus for fish that is effective for cranial surgery is described. The fishes are secured with clamp-arms which extend against the pectoral and pelvic girdles. The head is held by a plexiglass mouthpiece, designed specifically for the fish species under investigation. The mouthpiece is also responsible for gill irrigation. The use of the apparatus for the surgical pinealectomy of salmonids is described.

77-000986 Hallam, J. C. THE MODIFICATION OF VERTEBRAL NUMBER IN SALMONIDAE. Ph. D. dissertation, Univ. Toronto (Canada) 1974. From Diss. Abstr. Int. B Sci. Eng. 37(12), 1977. SFA 22(3)

Response of vertebral number to temperature of incubation in the Salmonidae varies among six species and many of their reciprocal hybrids. Two main responses are found. Brook and rainbow trout, brook trout by arctic/alpine char and brook by lake trout hybrids have more vertebrae the lower the temperature of development. Brown trout and probably Atlantic salmon too, exhibit a V-shaped response where fewer vertebrae are formed at intermediate temperatures.--From abstr.

- 77-000987 Hara, T. J. FURTHER STUDIES ON THE STRUCTURE-ACTIVITY RELATIONSHIPS OF AMINO ACIDS IN FISH OLFACTION. Comp. Biochem. Physiol. A Comp. Physiol. 56 (4): 559-565. 1977. SFA 22(3)
[Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada]
- 77-000988 Harichaux, P.; Gorin, J. MESURE EN CONTINU ET DE LONGUE DUREE DE LA FONCTION RESPIRATOIRE CHEZ LA TRUITE ARC-EN-CIEL (/SAIMO TRIDEUS/). [CONTINUOUS AND EXTENDED MEASUREMENT OF THE RESPIRATORY FUNCTION IN THE RAINBOW TROUT.] Ann. Hydrobiol. 7 (2): 91-96. 1976. In French with English summ. SFA 22(3)
[Lab. Physiol., U.E.P. Med., 12, rue Frederic Petit, 80036 Amiens Cedex, France]
- 77-000989 Hart, W. H.; Cook, M. ESTERASE ISOZYME PATTERNS IN DEVELOPING EMBRYOS OF /BRACHYDANTIO PERIO/ (ZEBRA DANIO), /BRACHYDANTIO ABOLINEATUS/ (PEARL DANIO), AND THEIR HYBRIDS. J. Exp. Zool. 199 (1): 109-128. Jan. 1977. SFA 22(3)
[Dep. Zool., Rutgers Univ., New Brunswick, NJ 08903]
- 77-000990 Hattingh, J. BLOOD SUGAR AS AN INDICATOR OF STRESS IN THE FRESHWATER FISH, /LABEO CAPPMUS/ (SMITH). J. Fish Biol. 10 (2): 191-195. Feb. 1977. SFA 22(3)
[Dep. Zool., Rand Afrikaans Univ., Johannesburg, South Africa]
Factors involved in the determination of the blood sugar level of /L. capensis/ have been studied. The stress of capture and transportation produces a marked increase in the blood sugar concentration. The relationship between blood sugar concentration and oxygen saturation of water and between blood sugar concentration and ammonium ion concentration was also investigated. Increases in ammonium ion concentration and decreases in oxygen saturation of water produce increases in the blood sugar concentration. The results are discussed in relation to the phenomenon of 'asphyxiation hyperglycemia'.
- 77-000991 Hayashi, S.; Ooshiro, T. AVAILABILITY OF GTP-SPPHAROSE FOR THE PURIFICATION OF GLUTAMATE DEHYDROGENASE FROM EEL LIVER. Bull. Jpn. Soc. Sci. Fish. 43 (1): 107-113. Jan. 1977. SFA 22(3)
[Fac. Fish., Kagoshima Univ., Kagoshima, Japan]
- 77-000992 Hays, P. M.; Levine, S. D.; Myers, J. D.; Heinemann, H. O.; Kaplan, M. A.; Franki, N.; Berliner, H. URIC ACID TRANSPORT IN THE DOGFISH DNEY. J. Exp. Zool. 199 (3): 309-316. Mar. 1977. SFA 22(3)
[Dep. Med., Albert Einstein Coll. Med., Bronx, NY 10461]
- 77-000993 Herring, P. J. BIOLUMINESCENCE IN AN EVERMANNELLID FISH. J. Zool. (Lond.) 181 (3): 297-307. Mar. 1977. SFA 22(3)
[Inst. Oceanogr. Sci., Wormley, Godalming, Surrey, U.K.]



77-000994 Higgs, D. A.; Eales, J. G. INFLUENCE OF FOOD DEPRIVATION ON RADIOIODOTHYRONINE AND RADIOIODIDE KINETICS IN YEARLING BROOK TROUT, /SALVELINUS FONTINALIS/ (MITCHILL), WITH A CONSIDERATION OF THE EXTENT OF L-THYROXINE CONVERSION TO 3,5,3'-TRIODO-L-THYRONINE. Gen. Comp. Endocrinol. 32 (1): 29-40. May 1977. SFA 22(3)
[Fish. Mar. Serv., 4160 Marine Drive, Vancouver, BC V7V 1N6, Canada]

77-000995 Hlavec, R. R.; Norden, C. R. TWO HERMAPHRODITIC FRESHWATER ALEWIVES FROM SOUTHERN LAKE MICHIGAN. Prog. Fish-Cult. 39 (2): 104-105. Apr. 1977. SFA 22(3)
[Zool. Dep., Univ. Wis., Milwaukee 53201]

77-000996 Hooli, A. A.; Nadkarni, V. B. A HISTOLOGICAL AND HISTOCHEMICAL STUDY OF INTERPENAL GLAND IN TWO TELEOSTS, /CIRRHINA MRIGALA/ (HAM) AND /LABEO POHITA/ (HAM). J. Anim. Morphol. Physiol. 23 (1,2): 199-204. June-Dec. 1976. SFA 22(3)
[Dep. Zool., Karnatak Univ., Dharwar-580003, India]

77-000997 Hornsey, D. J. TRIIODOTHYRONINE AND THYROXINE LEVELS IN THE THYROID AND SERUM OF THE SEA LAMPREY /PETROMYZON MARINUS/ L. Gen. Comp. Endocrinol. 31 (3): 381-383. Mar. 1977. SFA 22(3)
[Sch. Biol. Sci., Univ. Bath, Bath BA2 7AY, England]
Triiodothyronine (T3) and thyroxine (T4) concentrations have been measured in the serum and thyroidal tissue of /Petromyzon marinus/ using competitive protein binding analysis and radioimmunoassay. Both hormones were found in the gland but only T3 was present in the sera of all animals sampled. T4 was present in significant quantities only in the sera of fully mature females.

77-000998 Hughes, G. M.; O'Neill, J. G.; van Aardt, W. J. AN ELECTROLYTIC METHOD FOR DETERMINING OXYGEN DISSOCIATION CURVES USING SMALL BLOOD SAMPLES: THE EFFECT OF TEMPERATURE ON TROUT AND HUMAN BLOOD. J. Exp. Biol. 65 (1): 21-38. Aug. 1976. SFA 22(3)
[Res. Unit Comp. Anim. Respiration, Univ. Bristol, Woodland Rd., Bristol BS8 1UG, England]

77-000999 Hunn, J. B.; Christenson, L. M. CHEMICAL COMPOSITION OF BLOOD AND BILE OF THE SHOVELNOSE STURGEON. Prog. Fish-Cult. 39 (2): 59-61. Apr. 1977. SFA 22(3)
[U.S. FWS, Fish Control Lab., La Crosse, WI 54601]

77-001000 Ince, B. W.; Thorpe, A. GLUCOSE AND AMINO ACID-STIMULATED INSULIN RELEASE /IN VIVO/ IN THE EUROPEAN SILVER EEL (/ANGUILLA ANGUILLA/ L.). Gen. Comp. Endocrinol. 31 (2): 249-256. Feb. 1977. SFA 22(3)
[Dep. Zool. Comp. Physiol., Queen Mary Coll. (Univ. London), Mile End Rd., London, E1 4NS, England]

77-001001 Ingleton, P. M.; Stribley, M. E. IMMUNOFLOUORESCENT IDENTIFICATION OF THE CELLS OF ORIGIN OF EEL (*ANGUILLA ANGUILLA*)/ PITUITARY HORMONES SEPARATED BY POLYACRYLAMIDE GEL ELECTROPHORESIS. Gen. Comp. Endocrinol. 31 (1): 37-44. Jan. 1977. SFA 22(3)
[Dep. Zool., The University, Western Bank, Sheffield S10 2TN, England]

77-001002 Ingram, G. A.; Alexander, J. E. THE PRIMARY IMMUNE RESPONSE OF BROWN TROUT (*SALMO TRUTTA*) TO INJECTION WITH CELLULAR ANTIGENS. J. Fish Biol. 10 (1): 63-72. Jan. 1977. SFA 22(3)
[Dep. Biol., Gardner St. Annex, Univ. Salford, Salford M6 6W7, England] The primary immune response of brown trout (*Salmo trutta* L.) was studied after injections of two cellular antigens--*Salmonella typhi*/H, flagellar antigen δ , and human group 'O' Rh+ red blood cells. Both intraperitoneal and intramuscular injections were employed. Agglutinins and complement-fixing antibodies were produced to *S. typhi*/ and haemagglutinins to human 'O' red blood cells. Maximum titres to *S. typhi*/ were reached after 49 days in the case of both agglutinins and complement-fixing antibody. Haemagglutinins reached a maximum value of 1 : 512 between 35 and 42 days. Haemagglutinins to human 'O' red blood cells were detected as early as 7 days after injection. Antibodies against *S. typhi*/ were found after 14 days. Natural haemolysins were present against horse, sheep and human groups 'A', 'B' and 'AB' but not with group 'O'. No natural haemagglutinins were present to the six types of red blood cells tested. No precipitins were detected to either *S. typhi*/ or human 'O' red blood cells by immunodiffusion.

77-001003 Iwata, K.; Kobashi, K.; Hase, J. [STUDIES ON MUSCLE ALKALINE PROTEASE--VI. PURIFICATION OF PROTEINS WHICH INDUCE THE "MODORI" PHENOMENON DURING KAMABOKO PRODUCTION AND OF CATHEPSIN A FROM CARP MUSCLE.] Bull. Jpn. Soc. Sci. Fish. 43 (2): 181-193. Feb. 1977. In Japanese with English summ. SFA 22(3)
[Fuji Chem. Ind., Ltd., Chokeiji, Takaoka, Japan]

77-001004 Iwata, K.; Nakai, N.; Kobashi, K.; Hase, J. SOME ENZYMATIC PROPERTIES OF CATHEPSIN A FROM CARP WHITE MUSCLE. Bull. Jpn. Soc. Sci. Fish. 43 (3): 307-314. Mar. 1977. SFA 22(3)
[Fuji Chem. Ind., Ltd., Chokeiji, Takaoka, Toyama Pref., Japan]

77-001005 Jansen, P. V. M.; Arias, I. M. BILIRUBIN METABOLISM IN THE SPINY DOGFISH, *SQUALUS ACANTHIAS*, AND THE SMALL SKATE, *RAJA ERINACEA*. Comp. Biochem. Physiol. B Comp. Biochem. 56 (3): 255-258. 1977. SFA 22(3)
[Liver Res. Cent., Albert Einstein Coll. Med., New York, NY]

77-001006 Jellyman, D. J. HERMAPHRODITE EUROPEAN PERCH *PERCA FLUVIATILIS*/ L. N. Z. J. Mar. Freshwater Res. 10 (4): 721-723. Dec. 1976. SFA 22(3)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 10-062, Wellington, New Zealand] An hermaphrodite European perch *Perca fluviatilis*/ L., 16.4 cm fork length, was caught in Lake Pounui, Wairarapa, New Zealand. The percentage of gonad weight to total body weight was 8.34, slightly below that of comparable females (9.55) but above that of males (4.92). The composition of the gonad by weight was ovary 46 percent, testes 37 percent, undifferentiated 17 percent. As spermatozoa were present in the testes and the ovary appeared to be developing normally, the fish was classified as a functional

77-001006 CONTINUED
hermaphrodite.

77-001007 Joassin, L.; Gerday, Ch. THE AMINO ACID SEQUENCE OF THE MAJOR PARVALBUMIN OF THE WHITING (*GADUS MERLANGUS*). Comp. Biochem. Physiol. B Comp. Biochem. 57 (2): 159-161. 1977. SFA 22(3)

[Lab. Muscle Biochem., Univ. Liege, 22, quai Van Beneden, B-4020 Liege, Belgium]

77-001008 Jobling, M.; Gwyther, D.; Grove, D. J. SOME EFFECTS OF TEMPERATURE, MEAL SIZE AND BODY WEIGHT ON GASTRIC EVACUATION TIME IN THE DAB */Limanda limanda/* (L.). J. Fish Biol. 10 (3): 291-298. Mar. 1977. SFA 22(3)

[Dep. Zool., The University, Glasgow, Scotland] Gastric emptying time in the dab, */Limanda limanda/*, has been studied using an X-ray technique. The addition of 25 per cent barium sulphate to a test meal did not significantly affect the transit time. Lowering the experimental temperature from 16.4 to 8.5°C markedly decreased gastric evacuation time. An increase in ration size led to an increase in the time required to empty the stomach and also to increase the amount of food digested per unit of time. For any given ration size, expressed as per cent body weight, the larger the animal the longer is the time required for evacuation of that meal. We suggest that the food intake per day, as a percentage of live body weight, will be smaller for larger */L. limanda/* in the wild.

77-001009 Johansen, K.; Iomholt, J. P.; Maloiv, G. M. O. IMPORTANCE OF AIR AND WATER BREATHING IN RELATION TO SIZE OF THE AFRICAN LUNGFISH */Protopterus amphibius/* PETERS. J. Exp. Biol. 65 (2): 395-399. Oct. 1976. SFA 22(3)

[Dep Zoophysiol., Aarhus Univ., DK-8000 Aarhus, Denmark]

77-001010 Johansson-Sjöbeck, M.-L.; Stevens, J. D. HAEMATOLOGICAL STUDIES ON THE BLUE SHARK, */Prionace glauca/* L. J. Mar. Biol. Assoc. U.K. 56 (1): 237-240. Feb. 1976. SFA 22(3)

[Dep. Zoophysiol., Univ. Göteborg, Fack, S-400 33 Göteborg, Sweden] The haematocrit for */Prionace/* was found to be 22.3 percent, which is similar to values reported for other carcharhinid and sphyrnid species. Haemoglobin content and mean haemoglobin concentration were respectively 5.7 g/100 ml and 25.7 percent. Erythrocytes were generally larger than reported for other carcharhinids.

77-001011 Johns, P. A. R. GROWTH OF THE ADULT GOLDFISH *PETITIA*. Ph.D. dissertation, Univ. Mich. 231 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001012 Johnson, S. L.; Fwing, R. D.; Lichtowich, J. A. CHARACTERIZATION OF GILL (NA K)-ACTIVATED ADENOSINE TRIPHOSPHATASE FROM CHINOOK SALMON, */Oncorhynchus tshawytscha/*. J. Exp. Zool. 199 (3): 345-354. Mar. 1977. SFA 22(3)

[R. D. Fwing: Oreg. Dep. Fish Wildl., 303 Extension Hall, Oreg. State Univ., Corvallis 97331]

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77-001013 Johnston, I. A.; Davison, W.; Goldspink, G. ENERGY METABOLISM OF CARP SWIMMING MUSCLES. J. Comp. Physiol. B Metab. Transp. Funct. 114 (2): 203-216. 1977. SFA 22(3)
[Dep. Physiol., Univ. St. Andrews, St. Andrews, Fife, Scotland]

77-001014 Karnaky, K. J., Jr.; Kinter, W. R. KILLIFISH OPERCULAR SKIN: A FLAT EPITHELIUM WITH A HIGH DENSITY OF CHLORIDE CELLS. J. Exp. Zool. 199 (3): 355-364. Mar. 1977. SFA 22(3)
[Dep. Anat., Temple Univ. Sch. Med., 3420 W. Broad St., Philadelphia, PA 19140]

77-001015 Kimura, I.; Murozuka, T.; Arai, K. [COMPARATIVE STUDIES ON BIOCHEMICAL PROPERTIES OF MYOSINS FROM FROZEN MUSCLE OF MARINE FISHES.] Bull. Jpn. Soc. Sci. Fish. 43 (3): 315-321. Mar. 1977. In Japanese with English summ. SFA 22(3)
[Lab. Biochem., Fac. Fish., Hokkaido Univ., Hakodate, Japan]

77-001016 Kleinzeller, A.; Dubyak, G.; Mullin, J. F.; McAvoy, E. M. THE PHLOXIZIN EFFECT ON THE TRANSPORT OF SUGARS AT THE ANTIMUNAL FACE OF TEASED FLOUNDER TUBULES. J. Exp. Zool. 199 (3): 391-394. Mar. 1977. SFA 22(3)
[Dep. Physiol., Univ. Pa. Sch. Med., Philadelphia 19174]

77-001017 Knudsen, E. I. STRUCTURE AND FUNCTION IN THE ELECTRORECEPTIVE MIDBRAIN OF CATFISH. Ph.D. dissertation, Univ. Calif. (San Diego). 120 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

77-001018 Korovin, V. A. METABOLIC RATE OF THE UNDERYEAPING OF THE CARP, /CYPRINUS CARPIO/, ADAPTED TO DIFFERENT WATER TEMPERATURES. J. Ichthyol. (Engl. Transl. Vopr. Iktiolog.) 16 (1): 168-172. 1976. SFA 22(3)
[Siberian Res. Tech. Plan. Inst. Livestock Breeding, Novosibirsk, USSR]

77-001019 Krebs, F.; Brandt, F. DER EINFLUSS DER SAUERSTOFFSPANNUNG AUF DIE TEMPERATUREADAPTATION DES ANAEROBEN STOFFWECHSELS IM MUSKELGEWEBE DES GOLDFISCHES (/CARASSIUS AURATUS AURATUS/ L.). [THE INFLUENCE OF OXYGEN TENSION ON TEMPERATURE ADAPTATION OF ANAEROBIC METABOLISM IN MUSCLE TISSUE OF GOLDFISH (/CARASSIUS AURATUS AURATUS/ L.).] Arch. Hydrobiol. 76 (2): 229-247. Oct. 1975. In German with English summ. SFA 22(3)

[Zool. Inst., Univ. Kiel, West Germany] If goldfishes (/Carassius a. auratus/ L.) are kept in well aerated water and adaptation temperature (AT) is changed, the anaerobic acid production of lateral white muscles shows a capacity adaptation in the sense of a compensation. The anaerobic metabolic-CO₂ production of the same tissue, however, shows an inverse compensation (type 5). When the AT-change is combined with a change of oxygen pressure in the respiration water from normoxic to hypoxic level, the effects of temperature change are less significant. Acclimation to hypoxia tends to increase the metabolic-CO₂ production and decrease acid production in both cold- and warm-adapted animals.

77-001020 Krebs, F. DER EINFLUSS DER SAUERSTOFFESPAUNUNG AUF DIE TEMPERATURADAPTATION DES GIERPIS (/CARASSIUS AURATUS GIBELIO/ BLOCH). [THE INFLUENCE OF OXYGEN TENSION ON THE TEMPERATURE ADAPTATION IN GIBEL CARP (/CARASSIUS AURATUS GIBELIO/ BLOCH)]. Arch. Hydrobiol. 76 (1): 89-131. Sept. 1975. In German with English summ. SFA 22(3)

[Zool. Inst., Univ. Kiel, West Germany] If gibel carps (/Carassius auratus gibelio/ Bloch) are kept in well aerated water and adaptation temperature (AT) is changed, oxygen consumption of the lateral white muscles and gills shows a capacity adaptation in the sense of a compensation. When gibel carps are transferred from normoxic to hypoxic water, however, no change in the rate of respiration occurs with changing AT. Fishes for a long time acclimated to hypoxia before an AT-change under hypoxic conditions show a compensation as normoxic fishes do. There are seasonal differences in the heat resistance adaptation of tissue respiration. Acclimation to hypoxia can alter oxygen consumption and heat resistance of the tissues. Heat resistance of whole fishes, acclimated to normoxia or hypoxia, does not differ; after an increase of AT both groups show a reasonable resistance adaptation.

77-001021 Kryvi, H.; Totland, G. K. HISTOCHEMICAL STUDIES WITH MICROPHOTOMETRIC DETERMINATIONS OF THE LATERAL MUSCLES IN THE SHARKS /ETMOPTERUS SPINAX/ AND /GALUS MFLASTOMUS/. J. Mar. Biol. Assoc. U. K. 57 (1): 261-271. Feb. 1977. SFA 22(3)

[Inst. Anat., Univ. Bergen, Arstadvollen, 5000 Bergen, Norway]

77-001022 Kuchnow, K. D.; Scott, J. R. ULTRASTRUCTURE OF THE CHORION AND ITS MICROPYLE APPARATUS IN THE MATURE /FUNDULUS HETEROCLITUS/ (WALBAUM) OVUM. J. Fish Biol. 10 (3): 197-201. Mar. 1977. SFA 22(3)

[Case Existol. Lab. Ltd., 783 Cave St., Victoria, BC V9A 5T6, Canada] The ovum 'membranes' and the micropyle apparatus of mature, extruded ova of /Fundulus heteroclitus/ were examined by scanning electron microscopy. The ovum is covered by a thin jelly coat comprised of a dense mat of 0.3-0.5 μ m fibrils, except for a 50-100 μ m fibril-free zone surrounding the micropyle apparatus. The micropyle apparatus consists of a 50-100 μ m diameter funnel-shaped vestibule, at the bottom of which is a circular aperture 4-5 μ m in diameter leading to the micropyle canal which traverses the entire chorion layer. The inner micropyle aperture, 2-3 μ m diameter, apposes the inner ovoplasm mass. The chorion is the major protective coating of the ovum. It consists of a thin (0.4 μ m) outer zone, a thicker (9-12 μ m), lamellated inner zone with 4-10 lamellae, and sometimes an innermost crystalline zone, varying in thickness from 1-13 μ m. The extreme variability in the structure of the lamellated and crystalline zones of the chorion suggests that generalizations concerning ovum membranes can be misleading.

77-001023 Lagios, M. D.; McCosker, J. F. A CLOACAL EXCRETORY GLAND IN THE LUNGFISH /PROTOPTERUS/. Copeia 1977 (1): 176-178. 16 Mar. 1977. SFA 22(3)

[Steinhart Aquarium, Calif. Acad. Sci., San Francisco 94118]

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77-001024 Lapennas, G. N.; Schmidt-Nielsen, K. SWIMBLADDER PERMEABILITY TO OXYGEN. J. Exp. Biol. 67: 175-196. Apr. 1977. SFA 22(3)
[Dep. Zool., Duke Univ., Durham, NC 27706]

77-001025 Leatherland, J. P.; Cho, C. Y.; Slinger, S. J. EFFECTS OF DIET, AMBIENT TEMPERATURE, AND HOLDING CONDITIONS ON PLASMA THYROXINE LEVELS IN RAINBOW TROUT (/SALMO GATREDNERI/). J. Fish. Res. Board Can. 34 (5): 677-682. May 1977. In English with French summ. SFA 22(3)
[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada]

77-001026 Leger, C.; Luquet, P.; Poudon, M. EFFETS DE LA SUPPRESSION DES GLUCIDES DANS L'ALIMENTATION DE LA TRUITE APC-EN-CIEFL A LA TEMPERATURE DE 16 C. II.--EVOLUTION DES COMPARTIMENTS CORPORELS AVEC REFERENCE PARTICULIERE AUX ACIDES GRAS DES FAMILLES OMEGA 9, OMEGA 6, ET OMEGA 3. ET INFLUENCE D'UN CHANGEMENT DE TEMPERATURE. EFFECTS OF A SUCROSE-FREE DIET ON THE RAINBOW TROUT REARED AT A TEMPERATURE OF 16 C. II.--EVOLUTION OF THE BODY COMPARTMENTS PARTICULARLY ACCORDING TO THE FATTY ACIDS OMEGA 9, OMEGA 6, OMEGA 3. ACTION OF A CHANGE IN TEMPERATURE. 1 Ann. Hydrobiol. 7 (2): 185-201. 1976. In French with English summ. SFA 22(3)
[Stn. Rech. Nutr., Cent. Natl. Rech. Zootech., I.N.R.A., 78350 Jouy en Josas, France]

77-001027 Lidgerding, B. C. GLUCOSE METABOLISM IN CULTURES OF EMBRYONIC CELLS FROM COHO SALMON (/ONCORHYNCHUS KISUTCH/). Ph.D. dissertation, Oreg. State Univ. 202 p. 1977. From Diss. Abstr. Int. B. Sci. Eng. 37(9), 1977. SFA 22(3)

77-001028 Mackenzie, D. D. S.; Maack, T.; Kinter, W. B. RENAL EXCRETION OF CHLOROPHENOL, RED AND RELATED ORGANIC ACIDS IN THE INTACT FLOUNDER /PSEUDOPLEURONCTES AMERICANUS/. J. Exp. Zool. 199 (3): 449-458. Mar. 1977. SFA 22(3)
[Massey Univ., Palmerston North, New Zealand]

77-001029 Maetz, J.; Pic, P. MICROTHUBULES IN THE "CHLORIDE CELLS" OF THE GILL AND DISRUPTIVE EFFECTS OF COLCHICINE ON THE SALT BALANCE OF THE SEA WATER ADAPTED /MUGIL CAPITO/. J. Exp. Zool. 199 (3): 325-338. Mar. 1977. SFA 22(3)
[Dep. Biol., Comm. Energie Atomique, Stn. Zool., 06230 Villefranche-sur-Mer, France]

77-001030 Mangum, C. P.; Haswell, M. S.; Johansen, K. LOW SALT AND HIGH PH IN THE BLOOD OF AMAZON FISHES. J. Exp. Zool. 200 (1): 163-168. Apr. 1977. SFA 22(3)
[Dep. Biol., Coll William and Mary, Williamsburg, VA 23185] All but one of 15 species of fishes and two crustaceans from the Amazon River system have reduced levels of inorganic ion activity in the blood, which results from the purity of Amazon waters. In many of the teleosts, low ion activity is accompanied by high blood pH, due to the presence of high levels of HCO₃⁻ and ammonia. The activities of H⁺ and Cl⁻ have the important respiratory consequence of raising the oxygen affinity of the hemoglobins in water-breathing species in this chronically hypoxic environment.

77-001031 Maren, T. H. PHYSIOLOGY AND CHEMISTRY OF CEREBROSPINAL FLUID, AQUEOUS HUMOR AND ENDOLYMPH IN /SQUALUS ACANTHIAS/. J. Exp. Zool. 199 (3): 317-324. Mar. 1977. SFA 22(3)
[Univ. Fla. Sch. Med., Gainesville]

77-001032 Marshall, W. S. TRANSEPITHELIAL POTENTIAL AND SHORT-CIRCUIT CURRENT ACROSS THE ISOLATED SKIN OF /GILICHTHYS MIRABILIS/ (TELEOSTEI: GOBIIDAE), ACCLIMATED TO 5 PERCENT AND 100 PERCENT SEAWATER. J. Comp. Physiol. B Metab. Transp. Funct. 114 (2): 157-165. 1977. SFA 22(3)
[Dep. Zool., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

77-001033 Matthews, W. J.; Hill, L. G. TOLERANCE OF THE RED SHINER, /NOTROPIS LUTPENSIS/ (CYPRINIDAE) TO ENVIRONMENTAL PARAMETERS. Southwest. Nat. 22 (1): 89-98. 1 Mar. 1977. SFA 22(3)
[Dep. Zool., Univ. Okla., Norman] Among environmental parameters tested for tolerance of the red shiner, the species survived hydrogen ion concentrations between 5-10 pH units, salinity of 10 ppt, dissolved oxygen values of 1.50 ppm, and thermal shocks of T+10 to T-21°C. Tolerance of the red shiner to any one or a combination of the above mentioned parameters, in addition to its plasticity of feeding habits and reproductive capability, undoubtedly relate to the success and widespread distribution of this notropid within plains streams.

77-001034 Matyukhin, V. A.; D'yachenko, G. M. ELECTRICAL ACTIVITY OF THE RED AND WHITE MUSCLES OF THE BAIKAL GRAYLING, /THYMALLUS ARCTICUS BAICALENSIS/, AT DIFFERENT SWIMMING SPEEDS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 130-135. 1976. SFA 22(3)
[Inst. Physiol., Acad. Sci., Novosibirsk, USSR] The change in the values of an electromyogram (EMG) of the red and white muscles in different parts of the body of the Baikal grayling, /Thymallus arcticus baicalensis/, was studied at controlled swimming speeds (37, 57, 77, and 87 cm per sec) in an experimental apparatus. Measurements were taken simultaneously in the red and the white muscles of one of the five segments of the body. At given speeds of swimming the mean electrical activity is greater in the red muscles than in the white muscles. The increase in the mean electrical activity in the red muscles is observed up to the swimming speed of 77 cm/sec but thereafter it decreases or ceases altogether. An intensive increase in EMG values occurs in the white muscles when this speed is reached. A head to tail effect of increasing electrical activity is noted in the red and white muscles of the grayling, the maximum electrical activity being noted in the caudal section of the body at high swimming speeds.--From abstr.

77-001035 McCreery, D. B. SPATIAL ORGANIZATION OF RECEPTIVE FIELDS OF LATERAL LEMNISCUS NEURONS OF THE LATERAL LINE LOBE OF THE CATFISH /ICTALURUS NEBULOSUS/. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 113 (3): 341-353. 1977. SFA 22(3)
[Dep. Neurosurgery, Univ. Minn. Med. Sch., Minneapolis 55455]



77-001036 McCreery, D. B. TWO TYPES OF ELECTRORECEPTIVE LATERAL MEMBRISCAL NEURONS OF THE LATERAL LINE LOBE OF THE CATFISH /ICTALURUS NEBULOSUS/. CONNECTIONS FROM THE LATERAL LINE NERVE AND STEADY-STATE FREQUENCY RESPONSE CHARACTERISTICS. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 113 (3): 317-339. 1977. SFA 22(3)
 [Dep. Neurosurgery, Univ. Minn. Med. Sch., Minneapolis 55455]

77-001037 Menshutkin, V. V.; Natchin, Yu. V.; Vaynyunskaya, G. S. MATHEMATICAL MODELLING OF WATER-SALT BALANCE AND THE FUNCTION OF THE KIDNEYS OF THE SOCKEYE SALMON, /ONCORHYNCHUS NERKA/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 303-308. 1976. SFA 22(3)
 [USSR Acad. Sci., Leningrad, USSR] Experimental data on the function of the kidneys and on the dynamics of the water and salt metabolism of the sockeye salmon, /Oncorhynchus nerka/, are summarized in a mathematical model. The model is based on the results of physiological experiments carried out on young sockeye salmon during the period of downstream migration and it incorporates the mechanism by which the body volume of the fish is regulated and by which osmotic concentration and the content of sodium and magnesium ions in the blood plasma are kept at a constant level. The correct functioning of the model was verified in series of physiological tests involving the injection of salts into the fish.

77-001038 Meyer, W.; Sauerbier, I. THE DEVELOPMENT OF CATECHOLAMINES IN EMBRYOS AND LARVAE OF THE RAINBOW TROUT (/SALMO GAIRDNERI/ RICH.). J. Fish Biol. 10 (5): 431-435. May 1977. SFA 22(3)

[Inst. Zool., Tierärztliche Hochschule, 3 Hanover, Fischhofsholer Damm 15, B.P.D.1 Catecholamines are present in the late embryonal and early larval development stages (alevin) of the rainbow trout. Changes in the alevin behaviour can be related to the catecholamine concentrations.

77-001039 Mironova, N. V. CHANGES IN THE ENERGY BALANCE OF /TILAPIA MOSSAMBICA/ IN RELATION TO TEMPERATURE AND RATION SIZE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 120-129. 1976. SFA 22(3)

[Zool. Inst., Acad. Sci., Leningrad, USSR] It was found that assimilability of food increases with the increase in the age of the fish and with an increase in temperature; when the fish are fed to excess, assimilability decreases by comparison with assimilability in the case of restricted feeding. The temperature most favorable for growth changes with the age of the fish. A stimulation in growth is observed prior to the onset of sexual maturity at an increase in temperature from 22 to 31°. In fish which have attained sexual maturity, the temperature most favorable for growth decreases gradually. With a deficiency of food the decrease in the temperature most favorable for growth occurs at an earlier age.--From abstr.

77-001040 Morgan, G. C., Jr. THE NEUROEMBRYOLOGICAL DEVELOPMENT OF THE TELENCEPHALON IN THE MARINE CATFISH, /ARIUS FELIS/. J. Mar. Sci. 2 (3): 57-94. 1974. SFA 22(3)

[Dep. Anat., Univ. South Fla., Tampa 33620] The Alabama region of Mississippi Sound was sampled during June, July and August of 1970-1971 for incubating marine catfish, /Arius felis/. Field data for these collections, a method for laboratory rearing of the embryonic material, and a description of the growth rate and gross appearance of the embryonic fish are presented and correlated. On the basis of these data a pattern of movement of the marine catfish within Mississippi Sound during incubation is suggested.

77-001041 Muciya, Y.; Watabe, N. STUDIES ON FISH SCALE FORMATION AND RESORPTION--II. EFFECT OF ESTRADIOL ON CALCIUM HOMEOSTASIS AND SKELETAL TISSUE RESORPTION IN THE GOLDFISH, /CARASSIUS AURATUS/, AND THE KILLIFISH, /FUNDULUS HETEROCLOTUS/. Comp. Biochem. Physiol. A Comp. Physiol. 57 (2): 197-202. 1977. SFA 22(3)
[Fac. Fish., Hokkaido Univ., Hokkaido, 040, Japan]

77-001042 Mustafa, S. NUCLEIC ACID TURNOVER IN THE DARK AND WHITE MUSCLES OF SOME FRESHWATER SPECIES OF CARPS DURING GROWTH IN THE PRE-MATURITY PHASE. Copeia 1977 (1): 173-176. 16 Mar. 1977. SFA 22(3)
[Sect. Ichthyol. Fish. Dep. Zool., Aligarh Muslim Univ., Aligarh, U.P., India]

77-001043 Nakagawa, F.; Nanba, K.; Kayama, M.; Murachi, S. ELECTROPHORETIC PROPERTIES OF PLASMA PROTEIN RELATING TO SOME BLOOD PROPERTIES IN CULTURED YELLOW TAIL. Bull. Jpn. Soc. Sci. Fish. 43 (1): 75-81. Jan. 1977. SFA 22(3)
[Dep. Fish., Hiroshima Univ., Fukuyama, Japan]

77-001044 Neale, W. L.; Honn, K. V.; Chavin, W. HEMATOLOGICAL RESPONSES TO THERMAL ACCLIMATION IN A COLD WATER SONAIFORM (/HYTHODONTUS FRANCISCI/ GIRARD). J. Comp. Physiol. B Metab. Transp. Funct. 115 (2): 215-222. 1977. SFA 22(3)
[Dep. Biol., Wayne State Univ., Detroit, MI 48202]

77-001045 Nomura, T.; Kawatsu, F. [VARIATION OF HEMATOCRIT VALUES OF RAINBOW TROUT BLOOD SAMPLES INCUBATED UNDER DIFFERENT CONDITIONS.] Bull. Jpn. Soc. Sci. Fish. 43 (3): 301-306. Mar. 1977. In Japanese with English summ. SFA 22(3)
[Koide Br., Niigata Pref. Freshwater Fish. Exp. Stn., Okasinden Koide-machi, Niigata Pref., Japan]

77-001046 Norton, V. M.; Davis, K. B. EFFECT OF ABRUPT CHANGE IN THE SALINITY OF THE ENVIRONMENT ON PLASMA ELECTROLYTES, URINE VOLUME, AND ELECTROLYTE EXCRETION IN CHANNEL CATFISH, /ICTIOPUS PUNCTATUS/. Comp. Biochem. Physiol. A Comp. Physiol. 56 (3): 425-431. 1977. SFA 22(3)
[Dep. Biol., Memphis State Univ., Memphis, TN 38152]

77-001047 Ogawa, M. THE EFFECT OF HYPOPHYSECTOMY AND PROLACTIN TREATMENT ON THE OSMOTIC WATER INTAKE INTO THE ISOLATED GILLS OF THE JAPANESE EEL (/ANGUILLA JAPONICA/). Can. J. Zool. 55 (5): 872-876. May 1977. In English with French summ. SFA 22(3)
[Dep. Biol., Saitama Univ., Urawa, Saitama 338, Japan]

77-001048 Olivereau, M.; Olivereau, J. EFFECTS OF HYPOPHYSECTOMY AND PROLACTIN REPLACEMENT ON EEL KIDNEY STRUCTURE DURING ADAPTATION TO SEA WATER. Acta Zool. (Stockh.) 58 (2): 103-115. 1977. SFA 22(3)
[Lab. Physiol., Inst. Oceanogr., Paris, France]

77-001049 Olivereau, M.; Olivereau, J. EFFECT OF TRANSFER TO SEA WATER AND BACK TO FRESH WATER ON THE HISTOLOGICAL STRUCTURE OF THE EEL KIDNEY. J. Comp. Physiol. B Metab. Transp. Funct. 115 (2): 223-239. 1977. In English with French summ. SFA 22(3)
[Lab. Physiol. Inst. Oceanogr., 195, rue Saint-Jacques, F-75005 Paris, France]

77-001050 Paul, D. H.; Roberts, B. L. THE LOCATION AND PROPERTIES OF THE EFFERENT NEURONS OF THE HEAD LATERAL-LINE ORGANS OF DOGFISH. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 116 (1): 117-127. 1977. SFA 22(3)
[Dep. Physiol., Univ. Manchester, Manchester, England]

77-001051 Percy, R.; Potter, I. C. BLOOD CELL FORMATION IN THE RIVER LAMPREY, /LAMPETRA FLUVIATILIS/. J. Zool. (Lond.) 178 (3): 319-340. Mar. 1976. SFA 22(3)
[Dep. Zool., Univ. Newcastle upon Tyne, England]

77-001052 Perzanowska, A. LIGHT CHAINS OF FISH SKELETAL WHITE MUSCLE MYOSIN. Comp. Biochem. Physiol. B Comp. Biochem. 56 (3): 245-248. 1977. SFA 22(3)
[Dep. Comp. Anat., Inst. Zool., Jagiellonian Univ., Cracow, Poland]

77-001053 Pickering, A. D.; Macey, D. J. STRUCTURE, HISTOCHEMISTRY AND THE EFFECT OF HANDLING ON THE MUCOUS CELLS OF THE EPIDERMIS OF THE CHAR /SALVELINUS ALPINUS/ (L.). J. Fish Biol. 10 (5): 505-512. May 1977. SFA 22(3)

[Freshwater Biol. Assoc., Ferry House, Far Sawrey, Near Ambleside, Cumbria, England] The structure and histochemical characteristics of the epidermis of the char /Salvelinus alpinus/ (L.) were studied at the light microscope level. Sialic acid-containing glycoproteins appear to form the main components of the mucous or goblet cells. A single incidence of handling can significantly increase the concentration of superficial goblet cells in the epidermis. Repeated handling results in a maximal response after 1 week but this is reduced to control levels after 1 month. These results are interpreted in terms of the structure of the char epidermis.

77-001054 Plant, P. W.; Nielsen, J. B. K.; Haschemeyer, A. E. V. CONTROL OF PROTEIN SYNTHESIS IN TEMPERATURE ACCLIMATION. I. CHARACTERIZATION OF POLYPEPTIDE ELONGATION FACTOR 1 OF TOADFISH LIVER. Physiol. Zool. 50 (1): 11-21. Jan. 1977. SFA 22(3)
[Dep. Biol. Sci., Hunter Coll., New York, NY 10021]

77-001055 Ponniah, A. G.; Pandian, T. J. SURFACING ACTIVITY AND FOOD UTILIZATION IN THE AIR-BREATHING FISH /POLYACANTHUS CUPANUS/ EXPOSED TO CONSTANT PO(2). Hydrobiologia 53 (3): 221-227. 26 Apr. 1977. SFA 22(3)

[Sch. Biol. Sci., Madurai Univ., Madurai 625021 India] The influence of feeding on the surfacing frequency of the air-breathing fish /Polyacanthus cupanus/ was investigated. Feeding increased the surfacing and swimming activities. Food conversion, maintenance requirements and energy spent in swimming and surfacing were measured under different feeding regimes.

77-001056 Priede, I. G.; Tytler, P. HEART RATE AS A MEASURE OF METABOLIC RATE IN TELEOST FISHES; /SALMO GAIARDNERI/, /SALMO TRUTTA/ AND /GADUS MORHUA/. J. Fish Biol. 10 (3): 231-242. Mar. 1977. SFA 22(3)

[Univ. Aberdeen Dep. Zool., Tillydrone Ave., Aberdeen, Scotland] Measurements of oxygen consumption and heart rate showed that the range of variation in metabolic rate for any given heart rate in fish is too wide for any significant correlation to be used as a measure of metabolism as in some other vertebrates. By defining the maximum oxygen pulse a precise relationship can be established between maximum metabolic rate and heart rate. From field measurements of heart rate by telemetry useful information can be gained on metabolic rates.

77-001057 Priede, I. G.; Young, A. H. THE ULTRASONIC TELEMETRY OF CARDIAC RHYTHMS OF WILD BROWN TROUT (/SALMO TRUTTA/ L.) AS AN INDICATOR OF BIO-ENERGETICS AND BEHAVIOUR. J. Fish Biol. 10 (4): 299-318. Apr. 1977. SFA 22(3)

[Dep. Zool., Univ. Aberdeen, Tillydrone Ave., Aberdeen, Scotland] A new type of miniature ultrasonic telemetry transmitter weighing less than 4 g underwater and usable on fish of less than 0.5 kg weight is described. The signal consisting of a sound pulse triggered by the QRS spike of the electrocardiogram is detectable at ranges of 400 m. Continuous records lasting 7 days were made of cardiac rhythms of brown trout. Mean heart rates were low indicating a metabolic rate of not more than 1.55 times the basal metabolic rate. Maximum heart rates were rare, occupying less than 0.5 percent of the time; there was no evidence of build up of oxygen debt due to periods of high activity. Following a settling down period after the attachment of the transmitter, the fish exhibited a diurnal rhythm with higher heart rates during the day. The transition from day to night heart rates and vice versa in one fish was shown to anticipate solar altitude change by half-hour. Missing heart beats (cardiac inhibitory reflexes) are discussed as indicators of a sensory input, but they are not reliable indicators of feeding activity. It is concluded that stamina is not important for normal day to day survival of adult trout and the influence of various ecological factors is discussed.

77-001058 Qvist, J.; Weber, R. F.; DeVries, A. L.; Zapol, W. M. PH AND HAEMOGLOBIN OXYGEN AFFINITY IN BLOOD FROM THE ANTARCTIC COD /DISSOSTICHUS MAWSONI/. J. Exp. Biol. 67: 77-88. Apr. 1977. SFA 22(3)

[Dep. Anesthesia, Herlev Hosp., DK-2730 Herlev, Denmark]

77-001059 Rajagopal, P. K. RESPIRATORY METABOLISM AND ENERGY REQUIREMENTS OF EMBRYO, LARVAL AND JUVENILE MOUNTAIN WHITEFISH, /PROSOPIUM WILLIAMSONI/. Ph.D. dissertation, Utah State Univ. 112 p. 1975. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001060 Pao, T. R. EFFECTS OF SALINITY ON LARVAL GROWTH IN THE CALIFORNIA KILLIFISH, /FUNDULUS PARVIPINNIS/ GIRARD. Calif. Fish Game 63 (1): 22-28. Jan. 1977. SFA 22(3)

[Hawaii Inst. Mar. Biol., P.O. Box 1346, Kaneohe 96744] California killifish, (/Fundulus parvipinnis/) larvae, incubated and hatched in salinities of 5, 14, 33, and 55‰, were reared for 10 weeks in their respective incubation salinities. Larvae and juveniles were fed live /Artemia/ nauplii once daily (/ad libitum/). Length, wet weight, and dry weight of randomly sampled larvae were determined at 15-day intervals. Growth rates of the larvae were highest in 55 and lowest in 5‰. It is suggested that the observed differences in growth rates

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77-001060 CONTINUED

were related to the probable influence of salinity on food intake and conversion efficiency of the larvae.

77-001061 Rasmussen, L. E.; Rasmussen, R. A. EXOGENOUS ¹⁴C-UREA DISTRIBUTION IN SELECTED MARINE FISHES--ESPECIALLY TWO SPECIES OF SALMON, AND RESULTANT ALTERATION IN SERA AND GILL ENZYME LEVELS. Comp. Biochem. Physiol. A Comp. Physiol. 56 (3): 403-409. 1977. SFA 22(3)

[Wash. State Univ., Pullman 991631]

77-001062 Penfro, J. L. INTERDEPENDENCE OF ACTIVE NA AND CL TRANSPORT BY THE ISOLATED UPINARY BLADDER OF THE TELEOST, /PSEUDOPLEURONECTES AMERICANUS/. J. Exp. Zool. 190 (3): 383-390. Mar. 1977. SFA 22(3)

[Univ. Conn., Storrs 062681]

77-001063 Ridge, R. M. A. P. PHYSIOLOGICAL RESPONSES OF STRETCH RECEPTORS IN THE PECTORAL FIN OF THE RAY /RAJA CLAVATA/. J. Mar. Biol. Assoc. U.K. 57 (2): 535-541. May 1977. SFA 22(3)

[Dep. Physiol., Univ. Bristol, Med. Sch., University Walk, Bristol, BS8 1TD, England]

77-001064 Roberts, B. L.; Ryan, K. P. CYTOLOGICAL FEATURES OF THE GIANT NEURONS CONTROLLING ELECTRIC DISCHARGES IN THE RAY, /TORPEDO/. J. Mar. Biol. Assoc. U.K. 55 (1): 123-131. Mar. 1975. SFA 22(3)

[The Lab., Mar. Biol. Assoc., Citadel Hill, Plymouth, England]

77-001065 Robertson, J. D. CHEMICAL COMPOSITION OF THE BODY FLUIDS AND MUSCLE OF THE HAGFISH /MYXINE GIUTINOSA/ AND THE RABBIT-FISH /CHIMAERA MONSTROSA/. J. Zool. (Lond.) 178 (2): 261-277. Feb. 1976. SFA 22(3)

[Dep. Zool., Univ. Glasgow, Scotland]

77-001066 Rurak, D. W.; Perks, A. M. THE NEUROHYPOPHYSIAL PRINCIPLES OF THE WESTERN BROOK LAMPREY, /LAMPETRA RICHARDSONI/: STUDIES IN THE AMMOCETE LARVA. Gen. Comp. Endocrinol. 31 (1): 91-100. Jan. 1977. SFA 22(3)

[Nuffield Inst. Med. Res., Headley Way, Headington, Oxford, OX3 9D5, England]

77-001067 Sbikin, Yu. N. AGE-RELATED CHANGES IN THE FUNCTIONAL CHARACTERISTICS OF VISION IN THE "VERKHOVKA", /LEUCASPIUS DELINEATUS/, AND THE ROACH, /RUTILUS RUTILUS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 309-316. 1976. SFA 22(3)

[IEMEZh, USSR Acad. Sci., Moscow, USSR] Investigations were made on optomotor reaction. It was demonstrated that the functional characteristics of vision in the "verkhovka", /Leucaspius delineatus/, and the roach, /Rutilus rutilus/, undergo different changes during their ontogeny. This is linked with the differences in the ecology which are particularly manifested in their adult state.

SPORT FISHERY ABSTRACTS

77-001068 Scheich, H. NEURAL BASIS OF COMMUNICATION IN THE HIGH FREQUENCY ELECTRIC FISH, /EIGENMANNIA VIRESCENS/ (JAMMING AVOIDANCE RESPONSE). II. JAMMED ELECTRORECEPTOR NEURONS IN THE LATERAL LINE NERVE. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 113 (2): 207-227. 1977. SFA 22(3)

[Zool. Inst., Fachber. Biol. (10) Tech. Hochsch., Schnittspahnstrasse 3, D-6100 Darmstadt, West Germany]

77-001069 Scheich, H. NEURAL BASIS OF COMMUNICATION IN THE HIGH FREQUENCY ELECTRIC FISH, /EIGENMANNIA VIRESCENS/ (JAMMING AVOIDANCE RESPONSE). III. CENTRAL INTEGRATION IN THE SENSORY PATHWAY AND CONTROL OF THE PACEMAKER. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 113 (2): 229-255. 1977. SFA 22(3)

[Zool. Inst., Fachber. Biol. (10) Tech. Hochsch., Schnittspahnstrasse 3, D-6100 Darmstadt, West Germany]

77-001070 Scheich, H. NEURAL BASIS OF COMMUNICATION IN THE HIGH FREQUENCY ELECTRIC FISH, /EIGENMANNIA VIRESCENS/ (JAMMING AVOIDANCE RESPONSE). I. OPEN LOOP EXPERIMENTS AND THE TIME DOMAIN CONCEPT OF SIGNAL ANALYSIS. J. Comp. Physiol. A Sens. Neural Behav. Physiol. 113 (2): 181-206. 1977. SFA 22(3)

[Zool. Inst., Fachber. Biol. (10) Tech. Hochsch., Schnittspahnstrasse 3, D-6100 Darmstadt, West Germany]

77-001071 Schimmel, S. C. NOTES ON THE EMBRYONIC PERIOD OF THE PINFISH /LAGODON RHOMBOIDES/ (LINNAEUS). Fla. Sci. 40 (1): 3-6. 1977. SFA 22(3)

[U.S. EPA, Environ. Res. Lab., Gulf Breeze, FL 32561] Adult pinfish, /Lagodon rhomboides/, were collected during September and October, 1974 and 1975. Following a minimum of one wk holding period, females were initially injected with 200 IU human chorionic gonadotropin and injected with 400 IU every second day thereafter until mature ova (0.90-0.93 mm diam.) were produced. Ova were artificially fertilized and the embryonic period (sensu Palon, 1975) described and illustrated. Emergence occurred 48 hr after fertilization at 18°C and eye pigmentation appeared 144 hr after fertilization. Larval total length at emergence was 2.3 mm; at 96 hr post-emergence, 2.7 mm; and at 120 hr post-emergence, 2.5 mm. Decrease in length and death of larvae after 96 hr post-emergence was probably due to malnutrition and subsequent infection.

77-001072 Schmidt, J. T. EXPANSION OF THE HALF RETINAL PROJECTION TO THE TECTUM OF GOLDFISH. Ph.D. dissertation, Univ. Mich. 270 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001073 Schmidt-Nielsen, B. VOLUME REGULATION OF MUSCLE FIBRES IN THE KILLIFISH, /FUNDULUS HETEROClitus/. J. Exp. Zool. 199 (3): 411-418. Mar. 1977. SFA 22(3)

[Mount Desert Island Biol. Lab., Salsbury Cove, ME 04672]

SPORT FISHERY ABSTRACTS

77-001074 Scott, S. A. MAINTAINED FUNCTION OF FOREIGN AND APPROPRIATE JUNCTIONS ON REINNERVATED GOLDFISH EXTRAOCULAR MUSCLES. *J. Physiol.* 268 (1): 87-109. June 1977. SFA 22(3)
[Dep. Neurosci., McMaster Univ., 1200 Main St. West, Hamilton, ON L8S 4J9, Canada]

77-001075 Servizi, J. A.; Jensen, J. O. T. RESISTANCE OF ADULT SOCKEYE SALMON TO ACUTE THERMAL SHOCK. *Int. Pac. Salmon Fish. Comm. Prog. Rep.* No. 34. 11p. 1977. SFA 22(3)
[Int. Pac. Salmon Fish. Comm., New Westminster, BC, Canada] The upper lethal temperature due to acute thermal shock was about 24° C for adult sockeye. Adult sockeye were slightly less resistant to temperatures causing acute thermal stress than were juvenile sockeye. The thermal exposure causing acute thermal stress exceeded that which led to mortality caused by infections of */F. columnaris/*.--Concl.

77-001076 Sharp, G. D.; Dotson, R. C. ENERGY FOR MIGRATION IN ALBACORE, */THUNNUS ALALUNGA/*. *NOAA Fish. Bull.* 75 (2): 447-450. Apr. 1977. SFA 22(3)
[Inter-American Tropical Tuna Comm., La Jolla, CA 92038]

77-001077 Sherberger, P. F.; Benfield, E. F.; Dickson, K. L.; Cairns, J., Jr. EFFECTS OF THERMAL SHOCKS ON DRIFTING AQUATIC INSECTS: A LABORATORY SIMULATION. *J. Fish. Res. Board Can.* 34 (4): 529-536. Apr. 1977. In English with French summ. SFA 22(3)
[Pernbank Sci. Cent., 156 Heaton Park Dr., NE, Atlanta, GA 30306]

77-001078 Shimeno, S.; Hosokawa, H.; Hirata, H.; Takeda, M. [COMPARATIVE STUDIES ON CARBOHYDRATE METABOLISM OF YELLOWTAIL AND CARP.] *Bull. Jpn. Soc. Sci. Fish.* 43 (2): 213-217. Feb. 1977. In Japanese with English summ. SFA 22(3)
[Dep. Cult. Fish., Fac. Agric., Kochi Univ., Nankoku, Kochi Pref., 783 Japan]

77-001079 Shrode, J. B.; Gerking, S. D. EFFECTS OF CONSTANT AND FLUCTUATING TEMPERATURES ON REPRODUCTIVE PERFORMANCE OF A DESERT PUPFISH, */CYPRINODON N. NEVADENSIS/*. *Physiol. Zool.* 50 (1): 1-10. Jan. 1977. SFA 22(3)
[Dep. Biol., Occidental Coll., Los Angeles, CA 90041] Reproductive temperature tolerance tests were performed in the laboratory on an inbred stock of Amargosa pupfish, */Cyprinodon n. nevadensis/*. Egg production was optimal at constant temperature 24 through 32 C and at fluctuating temperatures 32-28 and 36-28 C. The reproductive tolerance range, defined as the range of optimal egg production with at least 50 percent hatchability, was 24 through 30 C, which is one-fifth of the range for normal activity and one-seventh of the critical thermal tolerance range. Temperature also affected the quality of eggs produced: temperature and yolk diameter were inversely related. The tolerance limits for oogenesis were narrower than the limits for successful hatching of healthy eggs exposed to temperature stress after spawning.

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- 77-001080 Siddiqui, A. O.; Siddiqui, A. H. VARIATION IN THE FREE AMINO ACID CONTENT OF SKELETAL MUSCLE OF /OPHICEPHALUS PUNCTATUS/ (BLOCH). *J. Fish Biol.* 10 (2): 185-189. Feb. 1977. SFA 22(3)
[Dep. Zool., Kenyatta Univ. Coll., P.O. Box 43844, Nairobi, Kenya]
- 77-001081 Sidell, R. D. TURNOVER OF CYTOCHROME C IN SKELETAL MUSCLE OF GREEN SUNFISH (/LEPOMIS CYANEUS/, R.) DURING THERMAL ACCLIMATION. *J. Exp. Zool.* 199 (2): 233-250. Feb. 1977. SFA 22(3)
[Chesapeake Bay Inst., Johns Hopkins Univ., Baltimore, MD 21218]
- 77-001082 Silva, P.; Solomon, P.; Spokes, K.; Epstein, P. H. OUBAIN INHIBITION OF GILL NA-K-ATPASE: RELATIONSHIP TO ACTIVE CHLORIDE TRANSPORT. *J. Exp. Zool.* 199 (3): 419-426. Mar. 1977. SFA 22(3)
[Dep. Med., Harvard Med. Sch., Beth Israel Hosp., Boston, MA 02215]
- 77-001083 Skow, L. C. BLOOD PROTEIN VARIATION IN EIGHT STOCKS OF CHANNEL CATFISH. Ph.D. dissertation, Texas A&M Univ. 74 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(8), 1977. SFA 22(3)
- 77-001084 Slyn'ko, V. I. MULTIPLE MOLECULAR FORMS OF MALATE DEHYDROGENASE AND LACTATE DEHYDROGENASE IN RUSSIAN STURGEON (/ACIPENSER GULDENSTADTI/ BP.) AND GREAT STURGEON (/HUSO HUSO/ L.). *Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.)* 229 (1-6): 201-204. Dec. 1976. SFA 22(3)
[Inst. Gen. Genet., Acad. Sci. USSR, Moscow, USSR]
- 77-001085 Smith, A. C. REACTIONS OF FISH RED BLOOD CELLS WITH MUCUS AND SERA FROM OTHER FISH(ES). *Calif. Fish Game* 63 (1): 52-57. Jan. 1977. SFA 22(3)
[Dep. Pathol., John A. Burns Sch. Med., Univ. Hawaii, 1960 East-West Rd., Honolulu 96822] The possibility was tested that an incompatibility among fishes may be based on skin mucus from some individuals reacting, probably immunologically, with red blood cells from other individuals. A preliminary study demonstrated that mucus from mullet, /Mugil cephalus/, clumped red cells from one of several tilapia, /Tilapia mossambica/. However, tilapia mucus had little, if any, effect on the tilapia red cells. A more extensive study was then carried out with red cells from the milkfish, /Chanos chanos/, tested against mucus and sera from the same milkfish, snapper, /Lutjanus fulvus/, and tilapia. No reactions of cells occurred in milkfish mucus or any serum, but there were moderate to strong reactions in the mucus of many snapper and a few tilapia. Research in progress is attempting to determine the frequency of mucus and red cell incompatibility reactions among and between other species; if there is an /in vivo/ correlation of these /in vitro/ findings, especially what the disease consequences (and, therefore, the significance to aquaculture) might be; and the value of a possible preventive measure.



77-001086 Smith, J. C. BODY WEIGHT AND THE HAEMATOLOGY OF THE AMERICAN PLAICE /HIPPOGLOSSOIDES PLATESSOIDES/. J. Exp. Biol. 67 17-28. Apr. 1977. SFA 22(3)

[Fish. Mar. Serv., Bedford Inst. Oceanogr., Dartmouth, NS, Canada]

77-001087 Smith, P. L.; Paulson, A. C. OSMOREGULATORY SEASONALITY AND FREEZING AVOIDANCE IN SOME FISHES FROM A SUBARCTIC PASSAGE COMMUNITY. Copeia 1977 (2): 362-369. 25 May 1977. SFA 22(3)

[Dep. Biol. Sci., Univ. Alaska, Fairbanks 99701] Osmotic responses and seasonal movements of fishes in Izembek Lagoon, a shallow embayment of the Bering Sea, were studied. Twenty-three species were collected during the study. Seven of these were year-round residents while 4 other species occur there only in the summer. Seasonal movements may be into fresh water (/Gasterosteus aculeatus/, /Platichthys stellatus/) or offshore into deeper water (/Pholis laeta/, /Pallasia barbata/, /Hexagrammos octogrammus/). Four of the 7 year-round residents exhibited winter serum osmotic concentrations about 60 percent above summer values. The relative proportion of electrolytes decreased with increasing osmotic concentration, indicating the accumulation of additional nonelectrolyte compounds in the body fluids. Although osmotic adjustments were dramatic, either supercooling or migration was still necessary to survive winter ambient temperatures.

77-001088 Smith, P. P. STUDIES ON THE ENERGY METABOLISM OF CULTURED FISHES. Ph. D. dissertation, Cornell Univ. 64p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(11), 1977. SFA 22(3)

Fish are among the most efficient animals in converting feed energy into human food. Direct calorimetry is the most accurate method of measuring heat production of animals. An adiabatic bomb calorimeter, modified to hold living fish was found to be an excellent instrument for direct calorimetry with fish. The increase in heat production with increasing temperature was found to be linear over the range 3° to 18°. Prediction equations for heat production of fish weighing 1 g to 4 g are: rainbow trout $HP = .59 + .0525T$; Atlantic salmon, $HP = .66 + .0339T$; brook trout, $HP = .41 + .0687T$ where HP is in kcal/hr/kg of fish and T is temperature in °C. The effect of body size on heat production was determined using fish ranging from 1 g to 57 g in weight. A log-log plot of heat production and body size showed an inflection point at about 4 grams. The slope of the line was almost linear below the inflection point. Above this point the heat production varied directly with the .63 power of body weight. A straight line fitted to all the data had a slope of .75. Equations for calculating the heat production of rainbow trout at 15° are: for fish weighing 1 to 4 g, $HP = 1.35W$ to the 1.0 and for fish weighing 4 to 57 g, $HP = 2.40W$ to the .63 when HP is cal/hr/fish and W is weight in grams. The heat increment of feeding of protein was not significantly different from the heat increment of feeding of carbohydrate; both were higher than that for fat. Heat increment was less than 5 percent of the metabolizable energy fed. Protein has a higher productive energy value for trout than it has for mammals or birds. Protein also has a higher productive energy value than carbohydrate when fed to fish.--From abstr.

77-001089 So, Y.-P.; Fenwick, J. C. RELATIONSHIP BETWEEN NET *CALCIUM INFLUX ACROSS A PERFUSED ISOLATED EEL GILL AND THE DEVELOPMENT OF POST-STANNIECTOMY HYPERCALCAEMIA. J. Exp. Zool. 200 (2): 259-264. May 1977. SFA 22(3)
[Dep. Biol., Univ. Ottawa, Ottawa, ON K1N 6N5, Canada]

77-001090 Spannhof, L. A STUDY OF THE CARBOHYDRATE METABOLISM OF THE FRESHWATER EEL, /ANGUILLA ANGUILLA/, AND THE RAINBOW TROUT, /SALMO GAIARDNERI/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 165-167. 1976. SFA 22(3)
[Biol. Sect., Rostock Univ., East Germany]

77-001091 Stevens, R. D.; Sutterlin, A. M. HEAT TRANSFER BETWEEN FISH AND AMBIENT WATER. J. Exp. Biol. 65 (1): 131-145. Aug. 1976. SFA 22(3)

[Dep. Zool., Univ. Guelph, Guelph, ON, Canada] The ability of fish gills to transfer heat was measured by applying a heat pulse to blood in the ventral aorta and measuring it before and after passing through the gills of a teleost, /Hemirhamphys americanus/. 80-90 percent of heat contained in the blood is lost during passage through the gills. The fraction of heat not lost during passage through the gills is due to direct transfer of heat between the afferent and efferent artery within the gill bar. The major fraction of metabolic heat (70-90 percent) is lost through the body wall and fins of the sea raven in sea water at 5°C; the remainder is lost through the gills.

77-001092 Stieber, S. F.; Cvancara, V. A. TISSUE DEAMINATION OF L-AMINO ACIDS IN THE TELEOST /STIZOSTEDION VITREUM/ (MITCHILL). Comp. Biochem. Physiol. B Comp. Biochem. 56 (3): 285-287. 1977. SFA 22(3)
[Dep. Biol., Univ. Wis., Eau Claire 54701]

77-001093 Stoff, J. S.; Silva, P.; Field, W.; Forrest, J.; Stevens, A.; Epstein, F. H. CYCLIC AMP REGULATION OF ACTIVE CHLORIDE TRANSPORT IN THE RECTAL GLAND OF MARINE ELASMOBRANCHS. J. Exp. Zool. 199 (3): 443-448. Mar. 1977. SFA 22(3)
[Dep. Med., Harvard Med. Sch., Beth Israel Hosp., Boston, MA]

77-001094 Stolte, H.; Galaske, P. G.; Eisenbach, G. M.; Lechene, C.; Schmidt-Nielsen, B.; Rovlan, J. W. RENAL TUBULE ION TRANSPORT AND COLLECTING DUCT FUNCTION IN THE ELASMOBRANCH LITTLE SKATE, /RAJA ERINACEA/. J. Exp. Zool. 199 (3): 403-410. Mar. 1977. SFA 22(3)
[Med. Sch. Hannover, Hannover, West Germany 30001]

77-001095 Tamura, S. O.; Morii, H.; Yuzuriha, M. RESPIRATION OF THE AMPHIBIOUS FISHES /PERIOPHTHALMUS CANTONENSIS/ AND /BOLEOPHTHALMUS CHINENSIS/ IN WATER AND ON LAND. J. Exp. Biol. 65 (1): 97-107. Aug. 1976. SFA 22(3)
[Fac. Fish., Nagasaki Univ., Japan]

77-001096 Tan-Tue, V. ETUDE DU DEVELOPPEMENT DU TUBE DIGESTIF DES LARVES DE BAR /DICENTRARCHUS LABRAX/ (L.). [STUDY ON THE DEVELOPMENT OF THE DIGESTIVE TRACT OF THE LARVAE OF /DICENTRARCHUS LABRAX/ (L.).] Arch. Zool. Exp. Gen. 117 (4): 493-509. Dec. 1976. In french with English summ. SFA 22(3)
[Lab. Oceanogr. Biol., 195, rue Saint-Jacques, 75005 Paris, France]

77-001097 Tavalga, W. N. BEHAVIOURAL THRESHOLDS FOR DIFFUSE ILLUMINATION IN THE GOLDFISH. J. Exp. Biol. 67: 89-96. Apr. 1977. SFA 22(3)

[Mote Mar. Lab., Sarasota, FL] Thresholds for diffuse, broad-band illumination were obtained for the goldfish (/Carassius auratus/) by avoidance conditioning. The light source was a television cathode-ray tube whose output was controlled over a range of 140 dB by a combination of 'brightness' control, blanking of scan lines, and neutral density filters. The threshold was calculated in terms of irradiance to be 2.9×10^{-6} uW cm⁻² ($\pm$ a standard deviation of 1.4). The determination of absolute, rather than relative, values, and the use of overhead, diffuse illumination provided data that would be ecologically and behaviourally relevant.

77-001098 Tavalga, W. N. MECHANISMS FOR DIRECTIONAL HEARING IN THE SEA CATFISH (/ARIUS FFLIS/). J. Exp. Biol. 67: 97-115. Apr. 1977. SFA 22(3)

[Mote Mar. Lab., Sarasota, FL]

77-001099 Thomas, A. E.; Donahoo, M. J. DIFFERENCES IN SWIMMING PERFORMANCE AMONG STRAINS OF RAINBOW TROUT (/SALMO GAIRDNERI/). J. Fish. Res. Board Can. 34 (2): 304-307. Feb. 1977. In English with French summ. SFA 22(3)

[U.S. FWS, Fish Farm. Exp. Stn., Stuttgart, AR 72160]

77-001100 Thomson, A. J.; Sargent, J. R. CHANGES IN THE LEVELS OF CHLORIDE CELLS AND (NA + K)-DEPENDENT ATPASE IN THE GILLS OF YELLOW AND SILVER EELS ADAPTING TO SEAWATER. J. Exp. Zool. 200 (1): 33-40. Apr. 1977. SFA 22(3)

[N.E.R.C. Inst. Mar. Biochem., Aberdeen AB1 3RA, Scotland]

77-001101 Thomson, A. J.; Sargent, J. R.; Owen, J. M. INFLUENCE OF ACCLIMATIZATION TEMPERATURE AND SALINITY ON (NA + K)-DEPENDENT ADENOSINE TRIPHOSPHATASE AND FATTY ACID COMPOSITION IN THE GILLS OF THE EEL (/ANGUILLA ANGUILLA/). Comp. Biochem. Physiol. B Comp. Biochem. 56 (3): 223-228. 1977. SFA 22(3)

[N.E.R.C. Inst. Mar Biochem., Aberdeen AB1 3PA, U.K.]

77-001102 Timonina, L. G. A STUDY OF BLOOD GROUPS IN THE EEL, /ANGUILLA ANGUILLA/, FROM THE COURLAND LAGOON AND VISTULA BAY. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 348-351. 1976. SFA 22(3)

[AtlantNIRO, Kaliningrad, USSR]

77-001103 Tokunaga, T.; Iida, H.; Miwa, K. THE GAS CHROMATOGRAPHIC ANALYSIS OF AMINES IN FISH. Bull. Jpn. Soc. Sci. Fish. 43 (2): 219-227. Feb. 1977. In Japanese with English summ. SFA 22(3)

[Tokai Reg. Fish. Res. Lab. Kachidoki, Chuo-ku, Tokyo, Japan]

77-001104 Trump, B. F.; Jones, R. T. CORRELATION OF STRUCTURE AND ACTIVE TRANSPORT IN THE TELEOST NEPHRON. J. Exp. Zool. 199 (3): 365-382. Mar. 1977. SFA 22(3)

[Dep. Pathol., Univ. Md. Sch. Med., Baltimore 21201]

77-001105 Tsin, A. T. C.; Beatty, D. D. VISUAL PIGMENT CHANGES IN RAINBOW TROUT IN RESPONSE TO TEMPERATURE. Science 195 (4284): 1358-1360. 25 Mar. 1977. SFA 22(3)

[Dep. Zool., Univ. Alberta, Edmonton, AB T6G 2E9, Canada] Lower water temperature (6°C in comparison to 16°C) favors a higher proportion of porphyropsin in the retina of rainbow trout (*Salmo gairdneri*), regardless of the light conditions (constant darkness or 12 hours of light and 12 of darkness). This response to temperature does not follow a Q(10) relation, namely an increase in the rate of a reaction produced by raising the temperature 10°C.

77-001106 Ungar, F.; Gunville, R. FORMATION OF 3ALPHA-HYDROXY-5BETA-PREGNAN-20-ONE IN THE OVARIES OF CATFISH, *HETEROPNEUSTES FOSSILIS* (BLOCH). Gen. Comp. Endocrinol. 31 (1): 53-59. Jan. 1977. SFA 22(3)

[Dep. Biochem., Univ. Minn. Med. Sch., Minneapolis 55455]

77-001107 Unsicker, K.; Polorius, T.; Lindmar, R.; Löffelholz, K.; Wolf, U. CATACHOLAMINES AND 5-HYDROXYTRYPTAMINE IN CORPUSCLES OF STANNIUS OF THE SALMONID, *SALMO IRIDEUS* L. A STUDY CORRELATING ELECTRON MICROSCOPICAL, HISTOCHEMICAL AND CHEMICAL FINDINGS. Gen. Comp. Endocrinol. 31 (1): 121-132. Jan. 1977. SFA 22(3)

[Dep. Anat., Univ. Kiel, Kiel, West Germany]

77-001108 van den Hurk, R.; Lambert, J. G. D. BIOSYNTHESIS OF 11BETA-HYDROXY AND 11-KETOANDROGENS IN THE TESTIS OF THE BLACK MOLLY, *POECILIA* (= *MOLLIFENSIA*) *LATIPINNA*. Comp. Biochem. Physiol. B Comp. Biochem. 56 (2): 117-118. 1977. SFA 22(3)

[Zool. Lab., Univ. Utrecht, Transitorium III, Padualaan 8, Utrecht, The Netherlands]

77-001109 Vasal, S.; Sundararaj, B. I. RESPONSE OF THE OVARY IN THE CATFISH, *HETEROPNEUSTES FOSSILIS* (BLOCH), TO VARIOUS COMBINATIONS OF PHOTOPERIOD AND TEMPERATURE. J. Exp. Zool. 197 (2): 247-264. Aug. 1976. SFA 22(3)

[Dep. Zool., Univ. Delhi, Delhi 110007, India]



SPORT FISHERY ABSTRACTS

77-001110 Venables, B. J. ASPECTS OF THE THERMAL ECOLOGY OF LARGemouth BASS (*MICROPTERUS SALMOIDES*) IN NORTH CENTRAL TEXAS. Ph. D. dissertation, North Tex. State Univ. 142p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(11), 1977. SFA 22(3)

The coefficient of body temperature change (K) ranged from -0.53 to -0.072 for bass weighing 73-1440 g. The double log regression of K on weight was similar to that reported for other poikilotherms (slope = -0.57; R = 0.93). Fingerling bass were eurythermal, being capable of surviving instantaneous temperature changes over a 20 C range at acclimation temperatures of 15, 25 and 30 C and over a 15 C range at acclimation temperatures of 20 and 35 C. Preferred temperatures for adult bass measured in the laboratory ranged from 27-32 C with no relationship to day or night. The overall mean preferred temperature was 29 C. The laboratory determined preferred temperatures were supported by limited field determined body temperatures taken in a vertical temperature gradient near the discharge of a power plant effluent. Routine metabolic rates of bass from a heated reservoir and a nearby hatchery were similar from 10-30 C in summer and winter. The weight exponent (0.77) and Q(10)s (1.6-2.9) were similar to those published for more northern bass populations; however, the Texas bass had lower metabolic rates than those published for the northern populations. Bass exposed to rapid temperature increase (0.2 C/min) from 25-30 C increased their metabolic rate by 53 percent but showed no detectable increase in opercular rate. Bass warmed from 30-35 C and 30-33 C increased their metabolic rate by 140 percent, and their opercular rates increased to over 100 beats per minute before death.

77-001111 Venables, B. J.; Pearson, W. D.; Fitzpatrick, L. C. THERMAL AND METABOLIC RELATIONS OF LARGemouth BASS, *MICROPTERUS SALMOIDES*, FROM A HEATED RESERVOIR AND A HATCHERY IN NORTH CENTRAL TEXAS. Comp. Biochem. Physiol. A Comp. Physiol. 57 (1): 93-98. 1977. SFA 22(3)

[Dep. Biol. Sci., North Texas State Univ., Denton 76203] Routine metabolic rates of largemouth bass from a heated reservoir and a nearby hatchery in north central Texas were similar from 10-30°C in summer and winter. The weight exponent and Q(10)'s for metabolism in Texas bass were similar to those published for northern populations. Texas bass had lower metabolic rates than those published for northern populations when compared at common temperatures. Results suggest that northern populations have apparently adapted metabolic rate-temperature patterns which enable similar levels of metabolism under colder climatic conditions.

77-001112 Wahlqvist, I.; Nilsson, S. THE ROLE OF SYMPATHETIC FIBRES AND CIRCULATING CATECHOLAMINES IN CONTROLLING THE BLOOD PRESSURE AND HEART RATE IN THE COD, *GADUS MORHUA*. Comp. Biochem. Physiol. C Comp. Pharmacol. 57 (1): 65-67. 1977. SFA 22(3)

[Dep. Zoophysiol., Fack, Univ. Goteborg, S-400 33 Goteborg 33, Sweden]

77-001113 Wallace, R. K., Jr. THERMAL ACCLIMATION, UPPER TEMPERATURE TOLERANCE, AND PREFERRED TEMPERATURE OF JUVENILE YELLOWTAIL SNAPPERS, *OCYRUS CHRYSURUS* (BLOCH) (PISCES: LUTJANIDAE). Bull. Mar. Sci. 27 (2): 292-298. Apr. 1977. SFA 22(3)

[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830] The rate of acclimation and temperature tolerance of juvenile yellowtail snappers, *Ocyurus chrysurus* (Bloch) was tested using the method of sudden exposure to elevated temperature. Acclimations of up to 10 days at various temperatures did not significantly change the 24-hour lethal temperature from that of a 1-day acclimation. Upper thermal

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tolerance was tested after 3-day acclimations at 20, 24, 28, 30, and 32°C. Lethal temperatures (for a 7-day exposure) ranged from 32.6°C at a 20°C acclimation to 33.5°C at a 32°C acclimation. No significant relationship was found between acclimation temperature and lethal temperature. The ultimate lethal temperature was estimated to fall between 33.5 and 34°C. Acclimation significantly raised median resistance times at test temperatures of 34 and 35°C. An upper thermal tolerance polygon of 108.8 units was constructed by arbitrarily considering 18°C as the lower temperature limit for juvenile yellowtail snappers. Preferred temperature was tested by acclimating and then exposing fish to a horizontal temperature gradient. Acclimation altered the mean preferred temperature, but the preferred temperature remained within the range normally encountered (24-30°C) by *O. chrysurus*.

77-001114 Walton, M. J.; Cowey, C. B. ASPECTS OF AMMONIOGENESIS IN RAINBOW TROUT, *Salmo gairdneri*. Comp. Biochem. Physiol. B Comp. Biochem. 57 (2): 143-149. 1977. SFA 22(3)
[N.E.R.C. Inst. Mar. Biochem., Aberdeen AB1, 3RA, Scotland]

77-001115 Webb, C. J. SMALL-SCALE CULTIVATION OF CELLS AND TISSUES FROM GOBIID TELEOSTS. J. Mar. Biol. Assoc. U.K. 55 (4): 933-938. Nov. 1975. SFA 22(3)
[Dep. Zool., Univ. Bristol, England]

77-001116 Weber, F. F.; Johansen, K.; Lykkeboe, G.; Maloij, G. M. O. OXYGEN-BINDING PROPERTIES OF HEMOGLOBINS FROM ESTIVATING AND ACTIVE AFRICAN LUNGFISH. J. Exp. Zool. 199 (1): 85-96. Jan. 1977. SFA 22(3)
[Dep. Zoophysiol., Univ. Aarhus, DK-8000 Aarhus, Denmark]

77-001117 Weber, R. F.; Wood, S. C.; Lomholt, J. P. TEMPERATURE ACCLIMATION AND OXYGEN-BINDING PROPERTIES OF BLOOD AND MULTIPLE HAEMOGLOBINS OF RAINBOW TROUT. J. Exp. Biol. 65 (2): 333-345. Oct. 1976. SFA 22(3)
[Dep. Zoophysiol., Univ. Aarhus, DK-8000 Aarhus C, Denmark]

Acclimation of rainbow trout to 5, 15 and 22°C for periods exceeding 4 months had no significant effect on the oxygen affinity of whole blood or on the concentration of ATP, which is the main organic phosphate in red cells. Slight differences were, however, found in the oxygenation properties of the haemolysates, which correlate with changes in the relative concentration of the multiple haemoglobins. The oxygen-binding properties of the main haemoglobin components account for the observed differences in the haemolysates. The possible thermoacclimatory significance of changes in haemoglobin multiplicity and co-factor concentrations is discussed.

77-001118 White, J. I. X-RAY CRYSTALLOGRAPHIC STUDIES OF DOGFISH MUSCLE LACTATE DEHYDROGENASE. Ph.D. dissertation, Purdue Univ. 222 p. 1976. SFA 22(3)

SPORT FISHERY ABSTRACTS

77-001119 Wigham, T.; Ball, J. N. EFFECT OF ENVIRONMENTAL SALINITY CHANGES ON THE SECRETORY ACTIVITY OF PROLACTIN CELLS IN OCULAR PITUITARY TRANSPLANTS IN /POECILIA LATIPINNA/ (TELEOSTEI). Gen. Comp. Endocrinol. 31 (1): 148-153. Jan. 1977. SFA 22(3)
[Dep. Zool., Univ. Sheffield, Sheffield S10 2TN, England]

77-001120 Wingfield, J. C.; Grimm, A. S. SEASONAL CHANGES IN PLASMA CORTISOL, TESTOSTERONE AND ESTRADIOL-17 BETA IN THE PLACER, /PLEURONectes PLATYSSA/ L. Gen. Comp. Endocrinol. 31 (1): 1-11. Jan. 1977. SFA 22(3)
[Dep. Zool., Univ. Wash., Seattle 98195]

77-001121 Wittenberger, C.; Coprean, D. SOME EFFECTS OF DENERVATION UPON WHITE AND RED MUSCLES IN CARP. Comp. Biochem. Physiol. A Comp. Physiol. 56 (3): 307-312. 1977. SFA 22(3)
[Biol. Res. Cent., Str. Republicii 48, Cluj, Romania] Denervation of lateral muscles in carp, by spinal cord destruction, elicits an increase of electrical excitability of the muscles, an increase of the glycogen content in the white muscle and a decrease in the red one, and a decrease of the percentage content of contractile proteins, especially in white muscle. The results suggest a less strong neural control of red than of white muscle, and of fish muscles than of those of higher vertebrates.

77-001122 Wold, J. K.; Selset, R. GLYCOPROTEINS IN THE SKIN MUCUS OF THE CHAR (/SALMO ALPINUS/ L.). Comp. Biochem. Physiol. B Comp. Biochem. 56 (3): 215-218. 1977. SFA 22(3)
[Inst. Phar., Univ. Oslo, P.O. Box 1068, Blindern, Oslo 3, Norway]

77-001123 Wong, T. M.; Chan, D. K. O. PHYSIOLOGICAL ADJUSTMENTS TO DILUTION OF THE EXTERNAL MEDIUM IN THE LIP-SHARK /HEMISCYLLIUM PLAGIOSUM/ (BENNETT/). II. BRANCHIAL, RENAL AND RECTAL GLAND FUNCTION. J. Exp. Zool. 200 (1): 85-96. Apr. 1977. SFA 22(3)
[Dep. Physiol., Univ. Hong Kong, Hong Kong]

77-001124 Yamamoto, Y.; Sato, M.; Ikeda, S. BIOCHEMICAL STUDIES ON L-ASCORBIC ACID IN AQUATIC ANIMALS--VIII. PURIFICATION AND PROPERTIES OF DEHYDRO-L-ASCORBIC ACID REDUCTASE FROM CARP HEPATOPANCREAS. Bull. Jpn. Soc. Sci. Fish. 43 (1): 59-67. Jan. 1977. SFA 22(3)
[Dep. Fish., Fac. Agric., Kyoto Univ., Kyoto, Japan]

77-001125 Yamamoto, Y.; Sato, M.; Ikeda, S. BIOCHEMICAL STUDIES ON L-ASCORBIC ACID IN AQUATIC ANIMALS--VII. REDUCTION OF DEHYDRO-L-ASCORBIC ACID IN FISHES. Bull. Jpn. Soc. Sci. Fish. 43 (1): 53-57. Jan. 1977. SFA 22(3)
[Dep. Fish., Fac. Agric., Kyoto Univ., Kyoto, Japan]

77-001126 Yasumoto, T.; Nakajima, I.; Bagnis, R.; Chungue, E. TOXINS IN THE GUT CONTENTS OF PARROTFISH. Bull. Jpn. Soc. Sci. Fish. 43 (1): 69-74. Jan. 1977. SFA 22(3)
[Lab. Food Sci., Fac. Agric., Tohoku Univ., Sendai, Japan] The gut contents and the liver of a parrotfish /Scarus gibbus/ contained ciguatera toxin but not scaritoxin in spite of the fact that the latter toxin is dominant in the flesh. Absence of scaritoxin in the diet suggested the possibility that the toxin was produced by the fish from a precursor in the diet. The conversion of the precursor, however,

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will not take place in the liver. The gut contents contained maitotoxin and acetone soluble toxin(s) besides ciguatoxin. This newly found acetone soluble toxin was assumed to be a basic compound of small molecular size having strong paralytic action. Algae content in the gut contents of the parrotfish was estimated to be very low on the basis of chlorophyll concentration. It was concluded that algae are not the organisms which produce the toxin(s).

77-001127 Volen, N. M. VISUAL DISCRIMINATION AFTER ABLATION OF THE CAUDAL OPTIC TECTUM IN THE GOLDFISH, /CARASSIUS AURATUS/. Ph. D. dissertation, Univ. Md. 83p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(12), 1977. SFA 22(3)

77-001128 Young, R. P.; Roper, C. W. F. INTENSITY REGULATION OF BIOLUMINESCENCE DURING COUNTERSHADING IN LIVING MIDWATER ANIMALS. NOAA Fish. Bull. 75 (2): 239-252. Apr. 1977. SFA 22(3)

[Dep. Oceanogr., Univ. Hawaii, Honolulu 96822] Nine species of midwater cephalopods, fish, and shrimp, examined in a shipboard aquarium, adjusted the intensity of their luminescence to match the intensity of the overhead light. Most animals tested could regulate this ventral countershading luminescence in response to a wide range of light intensities. A black anglerfish, /Cryptopsaras couesi/, also produced a faint later glow, indicating that bioluminescence may be important in lateral countershading in some species. Our observations indicate that ventral countershading is effective to depths of 570-775 m during the day off Hawaii. We suggest that the concealment strategy of ventral bioluminescent countershading is limited to depths greater than 350-400 m, largely because of the high visual acuity of predators and the high cost of producing countershading luminescence at lesser depths.

77-001129 Zhutenev, A. N.; Kalinich, D. S.; Abayev, Yu. I. EMBRYONIC AND LARVAL DEVELOPMENT OF THE LEAPING GRAY MULLET, /MUGIL SALIENS/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 63-67. 1976. SFA 22(3)

[VNIIPRKh, Krasnodarsk, USSR] Eggs were obtained from the leaping gray mullet, /Mugil saliens/, by means of pituitary injections and incubated in the Kiziltashskiy mullet farm. A description of the eggs, the embryonic, prolarval and larval periods of development is given. The eggs were incubated at a water temperature of 23.3-25.0° for 28-29 hours. A description of the young aged 1, 2, 3, 5 and 7 days from the moment of hatching is given.

GENETICS, VARIATION STUDIES AND HYBRIDIZATION

77-001130 Avise, J. C.; Straney, D. O.; Smith, M. H. BIOCHEMICAL GENETICS OF SUNFISH. IV. RELATIONSHIPS OF CENTRARCHID GENERA. Copeia 1977 (2): 250-258. 25 May 1977. SFA 22(3)

[Dep. Zool., Univ. Ga., Athens 30602] We have examined electrophoretic variation in proteins encoded by 11-14 loci in species representing all nine genera of Centrarchidae. A dendrogram based on allozyme information is compared to postulated relationships of sunfish genera based on general and specific morphologies, and on hybridizing propensity. The allozyme information correlates most strongly with that derived from a very detailed study of the acoustico-lateralis system by Branson and Moore. Similarities between the two sets of data are observed 1) in the clustering together of

77-001130 CONTINUED

species of */Lepomis/*; 2) in the clustering of */Lepomis/* with */Micropterus/*; 3) in the placement of */Acantharchus/* with */Archoplites/*; and 4) in the very distant relationship of */Flussoma/* to the other centrarchid genera. The levels of genetic similarity between centrarchid genera are compared to previously published levels of similarity between congeneric species of */Lepomis/*, subspecies of */Lepomis macrochirus/*, and geographic populations within the subspecies of */L. m. macrochirus/* and */L. m. purpureus/*. Mean levels of genetic similarity (S) are as follows: between genera, S = 0.29; between congeneric species, S = 0.53; between subspecies of */Lepomis macrochirus/*, S = 0.85; between geographic populations, S = 0.97.

77-001131 Avise, J. C.; Gold, J. P. CHROMOSOMAL DIVERGENCE AND SPECIATION IN TWO FAMILIES OF NORTH AMERICAN FISHES. *Evolution* 31 (1): 1-13. Mar. 1977. SFA 22(3)

[Dep. Zool., Univ. Ga., Athens 30602]

77-001132 Bergot, P.; Chevassus, B.; Blanc, J.-M. DETERMINISME GENETIQUE DU NOMBRE DE CAECA PYLOIQUES CHEZ LA TRUITE FARIO (*/SALMO TRUTTA/* LINNE) ET LA TRUITE ARC-EN-CIEL (*/SALMO GAIRDNERI/* RICHARDSON).

I.--DISTRIBUTION DU CARACTERE ET VARIABILITE PHENOTYPIQUE INTRA ET INTERFAMILLES. [GENETIC DETERMINATION OF THE NUMBER OF PYLORIC CAECA IN BROWN TROUT (*/SALMO TRUTTA/*) AND RAINBOW TROUT (*/SALMO GAIRDNERI/*). I.--CHARACTER DISTRIBUTION AND PHENOTYPIC VARIABILITY WITHIN AND BETWEEN FAMILIES.] *Ann. Hydrobiol.* 7 (2): 105-114. 1976. In French with English summ. SFA 22(3)

[Lab. Nutr. Poissons, Cent. Natl. Pech. Zootech., I.N.P.A., 78350 Jouy en Josas, France]

77-001133 Cataudella, S.; Sola, L. SEX CHROMOSOMES OF THE MOSQUITOFISH (*/GAMBUSIA AFFINIS/*): AN INTERESTING PROBLEM FOR AMERICAN ICHTHYOLOGISTS. *Copeia* 1977 (2): 382-384. 25 May 1977. SFA 22(3)

[Inst. Comp. Anat., Rome Univ., Rome, Italy]

77-001134 Champion, M. J.; Whitt, G. S. SYNCHRONOUS ALLELIC EXPRESSION AT THE GLUCOSEPHOSPHATE ISOMERASE /A/ AND /B/ LOCI IN INTERSPECIFIC SUNFISH HYBRIDS. *Biochem. Genet.* 14 (9-10): 723-737. 1976. SFA 22(3)

[G. S. Whitt: Dep. Genet. Develop., Univ. Ill., Urbana 61801]

77-001135 Champion, M. J.; Whitt, G. S. SYNCHRONOUS ALLELIC EXPRESSION AT THE GLUCOSEPHOSPHATE ISOMERASE /A/ AND /B/ LOCI IN INTERSPECIFIC SUNFISH HYBRIDS. *Biochem. Genet.* 14 (9,10): 23-737. 1976. SFA 22(3)

[G. S. Whitt: Dep. Genet. Develop., Univ. Ill., Urbana]

77-001136 Child, A. R. BIOCHEMICAL POLYMORPHISM IN CHAP (*/SALVELINUS ALPINUS/* L.) FROM LLYNNAU PERIS, PADARN, CWELLYN AND BODLYN. *Heredity* 38 (3): 359-365. June 1977. SFA 22(3)

[Fish. Lab., Pakefield Rd., Lowestoft, Suffolk NR33 0HT, England] Flood sera from char (*/Salvelinus alpinus/* L.) inhabiting four Welsh lakes were analysed for genetic polymorphisms. The transferrin and esterase loci demonstrated genetic similarities in continuous populations and genetic differences between geographically isolated populations. Whilst the genetic information obtained for the char of Llynnau Peris and Padarn would not seem to call for measures to

77-001136 CONTINUED

inhibit mixing of individuals from both lakes in the event of the destruction of Llyn Peris as a suitable char habitat, it is suggested that, in the interest of conservation of natural gene pools, the distinct populations of Tlynnau Bodlyn, Cwellyn and Peris/Padarn should be maintained in isolation and not altered by stocking with char from elsewhere.

77-001137 Darling, J. D. S. ELECTROPHORETIC VARIATION IN /CYPRINODON VARIEGATUS/ AND SYSTEMATICS OF SOME FISHES OF THE SUBFAMILY CYPRINODONTINAE. Ph.D. dissertation, Yale Univ. 160 p. 1976.. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

77-001138 Engel, W.; Kuhl, P.; Schmidtke, J. EXPRESSION OF THE PATERNALLY DERIVED PHOSPHOGLUCOSE ISOMERASE GENES DURING HYBRID TROUT DEVELOPMENT. Comp. Biochem. Physiol. B Comp. Biochem. 56 (2): 103-108. 1977. SFA 22(3)

[Inst. Humangenet. Anthropol., Univ. Freiburg. i. Br., West Germany]

77-001139 Ferris, S. D.; Whitt, G. S. LOSS OF DUPLICATE GENE EXPRESSION AFTER POLYPTOIDISATION. Nature 265 (5591): 258-260. 20 Jan. 1977. SFA 22(3)

[Dep. Genet. Develop., Univ. Ill., Urbana 618101]

77-001140 Forrester, C. P.; Tsuyuki, H.; Fuke, S.; Smith, J. E.; Schnute, J. FLATHEAD SOLE (/HIPPOGLOSSOIDES/) IN THE NORTH PACIFIC. J. Fish. Res. Board Can. 34 (4): 455-462. Apr. 1977. In English with French summ. SFA 22(3)

[Int. North Pac. Fish. Comm., 6640 Northwest Marine Drive, Vancouver, BC V6T 1X2, Canada]

77-001141 Franzin, W. G.; Clayton, J. W. A BIOCHEMICAL GENETIC STUDY OF ZOOGEOGRAPHY OF LAKE WHITEFISH (/COREGONUS CLUPEAFORMIS/) IN WESTERN CANADA. J. Fish. Res. Board Can. 34 (5): 617-625. May 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

77-001142 Kajishima, T. GENETIC AND DEVELOPMENTAL ANALYSIS OF SOME NEW COLOR MUTANTS IN THE GOLDFISH, /CARASSIUS AURATUS/. Genetics 86 (1): 161-174. May 1977. SFA 22(3)

[Biol. Inst., Fac. Sci., Nagoya Univ., Nagoya 464, Japan]

77-001143 Kligerman, A. D.; Bloom, S. E. RAPID CHROMOSOME PREPARATIONS FROM SOLID TISSUES OF FISHES. J. Fish. Res. Board Can. 34 (2): 266-269. Feb. 1977. In English with French summ. SFA 22(3)

[Dep. Poultry Sci., Cornell Univ., Ithaca, NY 14853]

77-001144 Kobayasi, H.; Nakano, K.; Nakamura, M. [ON THE HYBRIDS, 4N GINBUNA (/CARASSIUS AURATUS LANGSDORFII/) X KINBUNA (/C. AURATUS/ SUBSP.), AND THEIR CHROMOSOMES.] Bull. Jpn. Soc. Sci. Fish. 43 (1): 31-37. Jan. 1977. In Japanese with English summ. SFA 22(3)
[Dep. Biol., Japan Women's Univ., Japan]

77-001145 Kozlov, V. I.; Shcherbina, Z. N. NATURAL HYBRIDS OF THE WHITE BREEM, /BLICCA BJOERKNA/, AND THE VIMBA, /VIMBA VIMBA/, IN THE KUBAN LAGOONS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiyl.) 16 (1): 68-74. 1976. SFA 22(3)

[Inst. Hydrobiol., Acad. Sci., Kiev, USSR] Natural hybrids of the white bream, /Blicca bjoerkna/, and the vimba, /Vimba vimba/, were found which are clearly distinguishable by outward characters from the parent species. An identification key is submitted for the hybrids. The causal factors producing the hybrids are discussed.

77-001146 Moore, W. S. A HISTOCOMPATIBILITY ANALYSIS OF INHERITANCE IN THE UNISEXUAL FISH /POECILOPSIS 2 MONACHA-LUCIDA/. Copeia 1977 (2): 213-223. 25 May 1977. SFA 22(3)

[Dep. Biol., Wayne State Univ., Detroit, MI 48202]

77-001147 Pierce, D. F.; Howe, A. R. A FURTHER STUDY ON WINTER FLOUNDER GROUP IDENTIFICATION OFF MASSACHUSETTS. Trans. Am. Fish. Soc. 106 (2): 131-139. Mar. 1977. SFA 22(3)

[Div. Mar. Fish., Sandwich, MS 02563]

77-001148 Schreibman, M. P.; Kallman, K. D. THE GENETIC CONTROL OF THE PITUITARY-GONADAL AXIS IN THE PLATYFISH, /XIPHOPHORUS MACULATUS/. J. Exp. Zool. 200 (2): 277-294. May 1977. SFA 22(3)

[Biol. Dep., Brooklyn Coll. City Univ. N.Y., Brooklyn 11203]

77-001149 Shinderite, V. S.; Vasil'yev, V. P. THE KARYOTYPE OF THE VIMBA, /VIMBA VIMBA/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiyl.) 16 (2): 323-327. 1976. SFA 22(3)

[Inst. Zool. Parasitol., Lithuanian Acad. Sci., Vilnius, USSR] In the diploid set the karyotype of the vimba has 52 chromosomes, of which 12-14 pairs are metacentric and submetacentric and 14-12 pairs are subtelocentric and acrocentric. The number of chromosomal arms equals 76-80 respectively. No differences were found in the karyotype of the vimba from the Dnieper, Nyamunas and Kubin' Rivers.--Concl.

77-001150 Skow, L. C. SERUM ESTERASE VARIATION IN CHANNEL CATFISH: GENETIC AND POPULATION ANALYSIS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 57-62. 1975. SFA 22(3)

[Dep. Wildl. Fish. Sci., Texas Agric. Exp. Stn., Texas A & M Univ., College Station, 77843] Electrophoretic variation in channel catfish serum esterase was expressed as six phenotypes and determined by three codominant alleles at a single locus. Allelic frequencies varied considerably between populations. One allele, designated "fast", predominates in commercial stocks and may be associated with increased growth rate under intensive culture conditions.

77-001151 Stauffer, J. P., Jr.; Hocutt, C. H.; Denoncourt, R. F. AN INTERGENERIC CYPRINID HYBRID, /NOCOMIS PLATYRHINCUS/ X /NOTROPIS CHRYSOCEPHALUS/, FROM THE GREENBRIER RIVER DRAINAGE IN WEST VIRGINIA. Copeia 1977 (1): 172-173. 16 Mar. 1977. SFA 22(3)
[Appalachian Environ. Lab., Univ. Md., Frostburg 21532]

77-001152 Thompson, W. W. SOME ASPECTS OF CHROMOSOMAL EVOLUTION OF THE CICHLIDAE (TELEOSTEI:PERCIFORMES) WITH EMPHASIS ON NEOTROPICAL FORMS. Ph.D. dissertation, Univ. Texas (Austin). 141 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

77-001153 Thorgaard, G. H. HETEROGENEOUS SEX CHROMOSOMES IN MALE RAINBOW TROUT. Science 196 (4292): 900-902. 20 May 1977. SFA 22(3)
[Dep. Genet., Univ. Wash., Seattle 98195] A pair of subtelocentric chromosomes differs in the size of the short arm in male, but not female, rainbow trout (/Salmo gairdneri/). The morphological similarity of the X and Y chromosomes, and the observation of Y chromosomes intermediate between the X and normal Y, suggest that the sex chromosomes are at an early stage of differentiation in this species.

77-001154 Turner, B. J.; Liu, P. K. EXTENSIVE INTERSPECIFIC GENETIC COMPATIBILITY IN THE NEW WORLD KILLIFISH GENUS /CYPRINODON/. Copeia 1977 (2): 259-269. 25 May 1977. SFA 22(3)

[Mus. Zool., Univ. Mich., Ann Arbor 48109] Interspecific hybrids in the oviparous killifish genus /Cyprinodon/ have been produced in the laboratory from 14 different combinations (and 4 reciprocals) among 9 species. Hybrids were reared from all interspecific combinations from which fertilized ova were obtained. For the most part they were approximately intermediate in the expression of divergent parental morphological features but not in reproductive behavior. Although the majority of the hybrids were fertile, a few cases of male sterility or absence were recorded. Bispecific hybrids were used to produce a few trispecific and one fertile tetraspecific hybrid. The ease with which morphologically and behaviorally divergent /Cyprinodon/ species are hybridized in the laboratory suggests that the widely accepted correlation between hybridization potential and phylogenetic relationship may not hold for /Cyprinodon/ as well as some other genera (e.g., /Lepomis/, /Xiphophorus/; of highly interfertile yet morphologically distinctive fish species.

77-001155 Weatherby, C. AN ELECTROPHORETIC ANALYSIS OF FIVE HATCHERY STOCKS OF /ICTALURUS PUNCTATUS/ (CHANNEL CATFISH). J. Ala. Acad. Sci. 47 (3): 138. July 1976. SFA 22(3)

[Ala. Coop. Fish. Res. Unit, Auburn Univ., Auburn 36830] Abstract only. One hundred channel catfish were electrophoretically examined to determine the genetic variability and similarity of five hatchery stocks from Auburn University in Auburn, Alabama. Twenty fish were examined from each stock. Fourteen genetic loci were analysed, five of which were polymorphic and nine monomorphic. Results showed that stocks inbred for 15 years were less variable than those more recently removed from natural populations. When crosses were made between the two, the amount of variability in the new strain was intermediate. There is an indication that as many as 40 loci could be analysed in future studies. Of these, 14 appear to be polymorphic. With this much variability, future electrophoretic studies on this species should provide data of evolutionary, taxonomic, and genetic interest.

77-001156 Whitt, G. S.; Childers, W. P.; Shaklee, J. P.; Matsumoto, J. LINKAGE ANALYSIS OF THE MULTILOCUS GLUCOSEPHOSPHATE ISOMERASE ISOZYME SYSTEM IN SUNFISH (CENTRARCHIDAE, TELEOSTII). Genetics 82 (1): 35-42. Jan. 1976. SFA 22(3)
 [Dep. Genet. Develop., Univ. Ill., Urbana 618011]

77-001157 Zelinskiy, Yu. P. OSTEOLOGICAL DIFFERENTIATION AND SOME QUESTIONS ON THE ORIGIN OF ANADROMOUS AND LAKE POPULATIONS OF ATLANTIC SALMON, /SALMO SALAR/ IN THE BASINS OF THE WHITE SEA AND THE BALTIC SEA. J. Ichthyol. (Encl. Transl. Vopr. Ikhtiol.) 16 (2): 247-259. 1976. SFA 22(3)

[USSR Acad. Sci., Petrozovodsk, USSR] A short description of the skull, glossohyal and vomer of the lake populations of the Atlantic salmon, /Salmo salar/, in Karelia and of the White Sea salmon are given. The varying degree of differences of the freshwater forms from the diadromous form is shown in some characters, including those functionally linked: the size of the orbitosphenoid, of the orbital division and length of base of skull. The factors determining the variability and speculation on the origin of lake populations are discussed.

BEHAVIOR

77-001158 Barlow, G. W.; Wallach, S. J. COLOUR AND LEVELS OF AGGRESSION IN THE MIDAS CICHLID. Anim. Behav. 24 (4): 814-817. Nov. 1976. SFA 22(3)

[Dep. Zool. Mus. Vert. Zool., Univ. Calif., Berkeley 947201] Previous work established that gold morphs of the Midas cichlid (/Cichlasoma citrinellum/) dominate normal ones of about the same size. Left unresolved, however, was whether the gold morphs dominate because they are inherently more aggressive or because the gold colour inhibits aggression. The issue was clarified here by comparing levels of aggression within groups of golds only, normals only, and golds plus normals. At first the groups of golds were the least aggressive. Put 2 days later the levels of aggression in the other groups fell to about that of the golds. We conclude therefore that the gold colour inhibits attack, but that this effect is only discernible in groups when they are establishing inter-individual relationships disappearing when the groups stabilize. We suggest that gold coloration inhibits attacking by stimulating fear responses.

77-001159 Barlow, G. W.; Ballin, P. J. PREDICTING AND ASSESSING DOMINANCE FROM SIZE AND COLORATION IN THE POLYCHROMATIC MIDAS CICHLID. Anim. Behav. 24 (4): 793-813. Nov. 1976. SFA 22(3).

[Dep. Zool. Mus. Vert. Zool., Univ. Calif., Berkeley 947201] To test whether gold morphs dominate normal ones, twelve groups were observed, each consisting of three golds and three normals paired by weight. Golds dominated comparable normals. Smaller golds also profited from sharing the colour of the dominant fish. Contest and approach declined across days, but attack and yield remained high. Standard deviation of rank was progressively greater with higher rank, but uncertainty of rank plotted as an inverted U. Behaviours important in dominance showed high dependence on type of fish but low dependence on day; these behaviours also had more variation attributable to the coloration factor. From a set of stated criteria, dominance is deemed best assessed here by an index: (attacks) divided by (yields + attacks); contesting (threat) is actually misleading.

- 77-001160 Bowles, R. P. EFFECTS OF WATER VELOCITY ON ACTIVITY PATTERNS OF JUVENILE STRIPED BASS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 142-151. 1975(1976). SFA 22(3)
[Ecol. Prog., Univ. Tenn., Knoxville 37916] The activity of 10, 25, and 50-mm juvenile striped bass exposed to water velocities ranging from static to 27 cm/sec was analyzed to determine mobility, feeding response, positional orientation, and group interaction. Increased water velocity reduced the area traveled per unit time. Presence of food also reduced the area traveled. Rheotaxis, the orientation of a swimming fish with respect to the direction of stream flow, was variable at low velocities. At water velocities of 15 and 27 cm/sec positive rheotaxis occurred frequently, while lateral and negative rheotaxis were infrequently observed. Distance between fish, a measure of group interaction, decreased with increasing water velocity and also decreased with the addition of food.
- 77-001161 Burke, W. P. EFFECTS OF NUMBERS AND DENSITY ON AGGRESSIVE BEHAVIOR IN POND-RAISED *POECILIA RETICULATA* (PETERS). Ph.D. dissertation, State Univ. N.Y. (Stony Brook) 173 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)
- 77-001162 Coutant, C. C. COMPILATION OF TEMPERATURE PREFERENCE DATA. J. Fish. Res. Board Can. 34 (5): 739-746. May 1977. In English with French summ. SFA 22(3)
[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]
- 77-001163 Crawshaw, L. I. PHYSIOLOGICAL AND BEHAVIORAL REACTIONS OF FISHES TO TEMPERATURE CHANGE. J. Fish. Res. Board Can. 34 (5): 730-734. May 1977. In English with French summ. SFA 22(3)
[Biol. Dep., Portland State Univ., Portland, OR 97207]
- 77-001164 Dodson, J. J.; Young, J. C. TEMPERATURE AND PHOTOPERIOD REGULATION OF RHEOTROPIC BEHAVIOR IN PRESPAWNING COMMON SHINERS, *NOTROPIS CORNUTUS*. J. Fish. Res. Board Can. 34 (3): 341-346. Mar. 1977. In English with French summ. SFA 22(3)
[Dep. Biol., Univ. Waterloo, Waterloo, ON N2L 3G1, Canada]
- 77-001165 Dow, M.; Fwing, A. W.; Sutherland, I. STUDIES ON THE BEHAVIOUR OF CYPRINODONT FISH III. THE TEMPORAL PATTERNING OF AGGRESSION IN *APHYOSEMIUM STRIATUM* (BOULENGER). Behaviour 59 (3-4): 252-265. 1976. In English with German summ. SFA 22(3)
[Dep. Zool., Univ. Edinburgh, Scotland]
- 77-001166 Eaton, R. C.; Bombardieri, R. A.; Meyer, D. L. THE MAUTHNER-INITIATED STARTLE RESPONSE IN TELEOST FISH. J. Exp. Biol. 66: 65-81. Feb. 1977. SFA 22(3)
[Scripps Inst. Oceanogr., La Jolla, CA 92093]

SPORT FISHERY ABSTRACTS

77-001167 Farr, J. A. MALE RARITY OR NOVELTY, FEMALE CHOICE BEHAVIOR, AND SEXUAL SELECTION IN THE GUPPY, /POECILIA RETICULATA/ PETERS (PISCES: POECILIIDAE). Evolution 31 (1): 162-168. Mar. 1977. SFA 22(3)

[Fac. Biol., Univ. West Fla., Pensacola 325041

77-001168 Fine, M. L. VARIATION OF NATURAL AND BRAIN-STIMULATED SOUNDS OF THE OYSTER TOADFISH /OPSANUS TAU/ L. Ph.D. dissertation, Univ. of I. 82 p. 1976. From Diss. Abstr. Int. B. Sci. Eng. 37(5), 1976. SFA 22(3)

77-001169 Gee, J. H. EFFECTS OF SIZE OF FISH, WATER TEMPERATURE AND WATER VELOCITY ON BUOYANCY ALTERATION BY FATHEAD MINNOWS, /PIMEPHALES PROMELAS/. Comp. Biochem. Physiol. A Comp. Physiol. 56 (4): 503-508. 1977. SFA 22(3)

[Dep. Zool., Univ. Manitoba, Winnipeg, MB, Canada] Fathead minnows (/Pimephales promelas/) alter buoyancy by changing swimbladder volume to compensate for changes in water velocity with the lowest buoyancy attained in faster water velocities. Extent of buoyancy adjustment is greater and rate of increase faster at 21 than at 4.5°C. Buoyancy is inversely related to water velocity. Compared to large fish, small fish make a lesser adjustment, have a higher internal pressure, and secrete gas faster during an increase in buoyancy. Gas secretion is used to increase swimbladder volume. Changes in internal pressure occur during adjustment but do not influence the rate of adjustment.

77-001170 Gift, J. J. APPLICATION OF TEMPERATURE PREFERENCE STUDIES TO ENVIRONMENTAL IMPACT ASSESSMENT. J. Fish. Res. Board Can. 34 (5): 746-749. May 1977. In English with French summ. SFA 22(3)

[Ecological Analysts, Inc., Melville, NY 11746]

77-001171 Gruber, D. THE EFFECT OF FLOWING WATER ON THE LOCOMOTOR BEHAVIOR OF NURSE (/GINGLYMOSTOMA CIRRATUM/) AND LEMON (/NEGAPRION PREVIROSTRIS/) SHARKS AND ON THE ACCURACY OF LOCALIZATION OF A CHEMICAL SOURCE BY NURSE SHARKS. Ph.D. dissertation, Texas A&M Univ. 118 p. 1976. From Diss. Abstr. Int. B. Sci. Eng. 37(8), 1977. SFA 22(3)

The presence of flowing water (1.17 cm/s) was shown to affect the locomotor behavior in both species of shark. As compared to stagnant conditions, the locomotor variables velocity and frequency of turns tended to increase in the presence of flow. On the other hand, the average step lengths and variability of the frequency distributions for both velocity and angle classes decreased. Finally, a reversal in the ratio of right to left-handed turns made by nurse shark in response to flow was demonstrated. Furthermore, the presence of flow enhanced the accuracy of localization of discrete point sources of shrimp extract solution by the nurse shark. Although the chemical stimulus triggered rheotactic behavior, the steepness of the chemical gradient within the tank also played a role. It was postulated that both the presence of flow and the steepness of the chemical gradient interact and constitute jointly a new stimulus condition.--From abstr.

77-001172 Hesthagen, I. H. LOCOMOTORY ACTIVITY OF THE BLACK GORY, /GOBIUS NIGER/ L. (PISCES, GOBIIDAE), UNDER ARTIFICIAL LIGHT CONDITIONS, INCLUDING A FALSE DAWN AND DUSK. Sarsia 62: 9-18. 30 Dec. 1976. SFA 22(3)

[Inst. Mar. Biol. Limnol., P.O. Box 1064, Blindern, Oslo 3, Norway] Under controlled conditions in the laboratory the activity of the black goby was measured by means of IR light-source/photoreceptors over a 60 day period. The fishes were mainly active at light intensities of 65 and 160 lux, but the activity was not completely suppressed during the dark period (0 lux). At light intensities lower than 0.5 lux the activity was high, probably as a result of a prolonged twilight period, because activity was high both at dawn and dusk. When the light was switched on suddenly an activity peak occurred whereas no such peak was recorded following the light-off stimulus. Under conditions where cover was available the gobies showed reduced activity. Under twilight conditions no distinct activity peak was recorded, but instead a burst of activity occurred followed by a gradual increase in activity. It was difficult to draw any parallel between the laboratory results and the observations from the natural habitat.

77-001173 Huntingford, F. A. INTER- AND INTRASPECIFIC AGGRESSION IN MALE STICKLEBACKS. Copeia 1977 (1): 158-159. 16 Mar. 1977. SFA 22(3)

[Dep. Zool., The University, Glasgow, Scotland]

77-001174 Huntingford, F. A. AN INVESTIGATION OF THE TERRITORIAL BEHAVIOUR OF THE THREE-SPINED STICKLEBACK (/GASTEROSTEUS ACULEATUS/) USING PRINCIPAL COMPONENTS ANALYSIS. Anim. Behav. 24 (4): 822-834. Nov. 1976. SFA 22(3)

[Dep. Zool., The University, Glasgow, Scotland] The territorial responses of male three-spined sticklebacks to intruders of a variety of species were investigated. The results were subjected to a principal components analysis, followed by varimax rotation, methods whose general usefulness in analysing complex correlated responses are discussed. In all these tests, both when the subject had an empty nest and when they had newly hatched young, the factors which emerged were recognizable in terms of the major systems in which the behavior of sticklebacks is usually discussed. Re-analysis of data from Cullen using principal component analysis confirmed her original conclusions and unearthed some undetected results.

77-001175 Jearld, A., Jr. AN ETHOLOGICAL STUDY OF THE HONEY GOURAMI, /COLISA CHUNA/, AND ITS CONGENERS. Ph.D. dissertation, Okla. State Univ. 124 p. 1975. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

Courtship and reproductive behavior in /Colisa chuna/ and its congeners is stereotyped and species specific. A unique motor pattern, horizontal circling, in /Colisa lalia/ males is described for the first time in a courtship context. Acquisition of nuptial coloration is associated with establishment of a territory, increased aggressiveness, and nest building activity. Nests are constructed by males and anchored to emergent plants or other stationary objects. /C. lalia/ actively seeks plant material and detritus for nest construction. /C. chuna/ actively forms its spawn into a rounded cluster which is described here for the first time. Leading to the nest by the males is present in /Colisa/ species and is most striking in /C. chuna/ which performs a vertical stand. Pre-clasp times and activities are species specific. Generally sexual bouts are longer in /C. labiosa/ and /C. fasciata/ than in /C. chuna/ and /C. lalia/.

77-001175 CONTINUED

Parental care exhibited is most striking in frequency, duration and progeny manipulation in /C. chuna/.--From abstr.

77-001176 Loyacano, H. A., Jr.; Chappell, J. A.; Gauthreaux, S. A. SUN-COMPASS ORIENTATION IN JUVENILE LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/. Trans. Am. Fish. Soc. 106 (1): 77-79. Jan. 1977. SFA 22(3)

[Dep. Entomol. Econ. Zool., Clemson Univ., Clemson, SC 29631]

77-001177 Major, P. F. PREDATOR-PREY INTERACTIONS IN SCHOOLING FISHES DURING PERIODS OF TWILIGHT: A STUDY OF THE SILVERSIDES /PRANESUS INSULARUM/ IN HAWAII. NOAA Fish. Bull. 75 (2): 415-426. Apr. 1977. SFA 22(3)

[Dep. Biol. Sci., Simon Fraser Univ., Burnaby, BC V5A 1S6, Canada] Observations of free living and captive silversides were made in Kaneohe Bay, Hawaii, in October and November 1972 and September 1973. The silversides demonstrated changes in schooling behavior associated with changes in light levels during the periods of twilight. During morning twilight, individual silversides formed schools, which in some areas moved from deep water to shallow water over reefs. All silversides remained in large inactive schools in shallow water or along the edge of channels throughout the day. During evening twilight, schools left the reef and/or broke up, with individual silversides spreading out to feed near the surface. Predation upon the silversides, as evidenced by their jumping behavior, was most intense during the twilight periods as schools formed and broke up. Captive silversides, when not in the presence of predators, tended to increase their interfish distance when in diurnal schools. The formation and breakup of schools of these silversides appear to be very similar to behavioral patterns of related and unrelated species of fish in many parts of the world. Formation and break up of silverside schools appear to be related to the threat of predation, the availability of the silverside's food, and the visual sensitivity and thresholds of both the silversides and their predators.

77-001178 Mansuri, A. P. EFFECTIVE MUSCLE FORCE: A CONTRIBUTORY FACTOR IN DETERMINING FUNCTIONAL ABILITY OF PECTORAL, PELVIC AND CAUDAL FINS OF A FISH, /TILAPIA MOSSAMBICA/. J. Anim. Morphol. Physiol. 23 (1,2): 32-39. June-Dec. 1976. SFA 22(3)

[Dep. Biosci., Saurashtra Univ., Rajkot, Gujarat, India]

77-001179 Marliave, J. B. SUBSTRATUM PREFERENCES OF SETTLING LARVAE OF MARINE FISHES REARED IN THE LABORATORY. J. Exp. Mar. Biol. Ecol. 27 (1): 47-60. Apr. 1977. SFA 22(3)

[Vancouver Public Aquarium, In Stanley Park, Vancouver, BC, Canada] Various species of marine fish larvae were reared in the laboratory to allow observation of the substratum preferences of newly settling fish. The range of preferences for settling larvae of intertidal species corresponded to the adult niche breadth. The preferred substratum was always an element of the adult habitat, although not necessarily the same substratum preferred by the adults. Experiments with artificial substrata indicated that settlement preferences are based on tactile cues and light transmission. Depending upon the species, other factors such as current speed or salinity can also influence settlement.

77-001180 McCauley, R. W. LABORATORY METHODS FOR DETERMINING TEMPERATURE PREFERENCE. J. Fish. Res. Board Can. 34 (5): 749-752. May 1977. In English with French summ. SFA 22(3)
[Biol. Dep., Wilfrid Laurier Univ., Waterloo, ON N2L 3C5, Canada]

77-001181 McKaye, K. R. DEFENSE OF A PREDATOR'S YOUNG BY A HERBIVOROUS FISH: AN UNUSUAL STRATEGY. Am. Nat. 111 (978): 301-315. Mar.-Apr. 1977. SFA 22(3)

[Dep. Biol., Yale Univ., New Haven, CT 06520] One species of cichlid fish *Cichlasoma nicaraguense* was observed defending the young of the largest cichlid in the lake, the predator *C. dovii*. The behavior of these fish was analogous to that of cichlid parents defending young to which they were genetically related. With this added help, *C. dovii* parents were not required to attack predators upon their own young as often as conspecific parents without helpers. Survivorship of *C. dovii* young was increased by the added protection afforded by these nonrelated individuals. A model is given to explain this unusual behavior in terms of individual natural selection. The arguments presented account for this behavior in terms of delayed return benefit in that the individual (or his close kin) who defends the predator's young will later be repaid. This repayment is derived from the predator feeding on the main competitors of the altruist.--Summ.

77-001182 Medrick, P. A. TEMPERATURE SELECTION AND GROWTH OF THREE HAWAIIAN REEF FISHES AND THEIR DISTRIBUTIONS IN AREA OF HEATED EFFLUENT. Ph.D. dissertation, Univ. Hawaii. 149 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(8), 1977. SFA 22(3)

The selected temperatures of *Acanthurus triostegus sandvicensis* (manini), *Abudefduf abdominalis* (maomao), and *Chaetodon multicinctus* (butterflyfish), were determined under several experimental regimes in an electronically-controlled selection apparatus. Median selected temperatures over a period of 72 h were as follows: *C. multicinctus* (juvenile to adult), 24.9°C; adult *Ab. abdominalis*, 25.9°C; juvenile *Ab. abdominalis*, 30.2°C; adult *Ac. triostegus*, 29.2°C, juvenile *Ac. triostegus*, 29.3°C. The spatial distributions of these three species in relation to the water temperature, substrate type, and depth were observed during SCUBA dives along transects in the vicinity of the thermal plume at Kahe in 1974 and 1975. Substrate type was of overriding importance in the occurrence and location of all three species, since they were absent in sandy regions (i.e., substrates lacking shelter). Distributional patterns of fish and water temperatures showed: (1) juvenile *Ac. triostegus* at the highest temperatures, (2) *Ab. abdominalis* and larger *Ac. triostegus* at intermediate temperatures, and (3) *C. multicinctus* at the lowest temperatures. When the minimum ambient water temperatures measured in the field were considered, no significant difference was found (except for the larger *Ac. triostegus* in 1975) between the temperatures at locations of fish sightings and their laboratory-selected median temperature.--From abstr.



77-001183 Mochev, A. D. SOME ASPECTS OF "FAMILY" BEHAVIOR IN THE STICKLEBACK, /PUNGITIUS PUNGITIUS/, AND /GASTEPOSTEUS ACULFATUS/ UNDER EXPERIMENTAL CONDITIONS. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 172-176. 1976. SFA 22(3)
[IEMEZh, Moscow, USSR]

77-001184 Otto, R. G.; Rice, J. O. RESPONSES OF A FRESHWATER SCULPIN (/COTTUS COGNATUS GPACILIS/) TO TEMPERATURE. Trans. Am. Fish. Soc. 106 (1): 89-94. Jan. 1977. SFA 22(3)
[Chesapeake Bay Inst., Johns Hopkins Univ., Baltimore, MD 21218]

77-001185 Phillips, R. P. THE RELATIONSHIP BETWEEN SOCIAL BEHAVIOUR AND THE USE OF SPACE IN THE BENTHIC FISH /CHASMODON BOSQUIANUS/ LACPEDE (TELEOSTEI, BLENNIIDAE) IV. EFFECTS OF TOPOGRAPHY ON HABITAT SELECTION AND SHELTER CHOICE. Behaviour 60 (1-2): 1-27. 1977. In English with German summ. SFA 22(3)
[Dep. Biol., State Univ. Coll., Oneota, NY 13820]

77-001186 Reynolds, W. W. FISH ORIENTATION BEHAVIOR: AN ELECTRONIC DEVICE FOR STUDYING SIMULTANEOUS RESPONSES TO TWO VARIABLES. J. Fish. Res. Board Can. 34 (2): 300-304. Feb. 1977. In English with French summ. SFA 22(3)
[Biol. Dep., Pa. State Univ., Wilkes-Barre 18708]

77-001187 Reynolds, W. W.; Thomson, D. A.; Casterlin, M. E. RESPONSES OF YOUNG CALIFORNIA GRUNION, /LEURESTHES TENUIS/, TO GRADIENTS OF TEMPERATURE AND LIGHT. Copeia 1977 (1): 144-149. 16 Mar. 1977. SFA 22(3)
[Biol. Dep., Pa. State Univ., P.O. Box 1830, Wilkes-Barre 18708] In a laboratory temperature gradient, young California grunion, /Leuresthes tenuis/, exhibited a final modal preferendum of 25 C, 7 C lower than the final preferendum of young /L. sardina/ from the Gulf of California. No circadian rhythms in thermal preference were found, and the final preferendum was unaffected by acclimation temperature. Like /L. sardina/, young /L. tenuis/ were strongly attracted to bright light (10000 lux). In a simultaneous opposed gradient of temperature and light, the fish spent more time at the preferred temperature than at the preferred light intensity. The laboratory results are discussed in relation to observed field distribution and geographic range.

77-001188 Reynolds, W. W. TEMPERATURE AS A PROXIMATE FACTOR IN ORIENTATION BEHAVIOR. J. Fish. Res. Board Can. 34 (5): 734-739. May 1977. In English with French summ. SFA 22(3)
[Biol. Dep., Pa. State Univ., Wilkes-Barre 18708]

77-001189 Ribbink, A. J. CUCKOO AMONG LAKE MALAWI CICHLID FISH. Nature 267 (5608): 243-244. 19 May 1977. SFA 22(3)
[Dep. Zool. Entomol., Rhodes Univ., Grahamstown 6140, Republic of South Africa]

77-001190 Richards, F. P. TEMPERATURE PREFERENCE STUDIES IN ENVIRONMENTAL IMPACT ASSESSMENTS: AN OVERVIEW WITH PROCEDURAL RECOMMENDATIONS. INTRODUCTION. J. Fish. Res. Board Can. 34 (5): 729. May 1977. In English with French summ. SFA 22(3)
[Ecological Analysts, Inc., Melville, NY 11746]

77-001191 Richards, I. S. CHEMORECEPTION IN THE BROWN BULLHEAD CATFISH, /ICTALURUS NEBULOSUS/: INTRASPECIFIC DISCRIMINATION AND TERRITORIAL BEHAVIOR, AND THE RECOGNITION OF FOUR SYMPATRIC TELEOSTS. Ph.D. dissertation, N. Y. Univ. 106 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

Brown bullhead catfish, /*Ictalurus nebulosus*/, were conditioned to discriminate between the individuals of a group composed of ten conspecifics, and between goldfish, /*Carassius auratus*/, pumpkinseed sunfish, /*Lepomis gibbosus*/, American eel, /*Anguilla rostrata*/, and margined madtom, /*Noturus insignis*/. Bullheads could not be conditioned to discriminate between two individuals within any conspecifics, thus suggesting that a communication system, effected by pheromones, operates among conspecifics. In addition, bullheads were capable of recognizing their own distinct odors, without imposing a conditioning regime. It was conclusively demonstrated that the urine contained those chemicals involved in the recognition process between conspecifics of /*Ictalurus nebulosus*/. Both the urine, and the mucus of the integument were involved in the marking of territories. In an environment with the potential for all fish to establish individual territories, social groups formed only under the conditions of anosmia, and urinary bladder cannulation. In contrast, small but stable social groups formed in a laboratory environment which precluded the possibility of individual territory establishment. The results of this investigation indicated that chemoreception is the dominant sensory modality involved in the discrimination of individuals, and in the establishing and maintaining of territories in /*Ictalurus nebulosus*/.

77-001192 Ross, M. P. AGGRESSION AS A SOCIAL MECHANISM IN THE CREEK CHUB (/SPERMOTILUS ATROMACULATUS/). Copeia 1977 (2): 393-397. 25 May 1977. SFA 22(3)
[Dep. Forestry Wildl. Manage., Univ. Mass., Amherst 01002]

77-001193 Serebrov, L. I. RELATIONSHIP BETWEEN SCHOOL DENSITY AND SIZE OF FISH. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 135-140. 1976. SFA 22(3)

[PINRO, Murmansk, USSR] A comparison of the size series of some species of fish with the density of their moving schools under natural conditions shows that the ratio of the mean distance between the fish in the school (R) to their mean length (l) is close to a constant value, while the mean absolute density of the school is inversely proportional to the third power of the mean distance between fishes.-- From abstr.

77-001194 Tooker, C. P. THE ONTOGENY OF AGONISTIC BEHAVIOR IN THE BLUE GOURAMI, /TRICHOGASTER TRICHOPTERUS/. Ph.D. dissertation, Okla. State Univ. 126 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

Patterns in the development of early larval motor patterns and sensory capabilities suggest a progressively developing nervous system with increasingly complex degrees of morphological and physiological integration. Motor patterns which are utilized in agonistic interactions appear first in non-agonistic contexts and after their

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77-001194 CONTINUED

appearance in agonistic interactions occur closer and closer together in temporal sequences. The dominant-subordinate relationship between two fish in a dyadic encounter "evolves" during the course of development as an increasing cooperation between the two fish in the exchange of behavioral signals which decide the winner and loser of a fight. Social experiences at different stages during development have different effects on the agonistic behaviors exhibited by mature fish. The ontogeny of social relationships in the blue gourami plays a major functional role in the distribution of fish and their utilization of available habitat at all stages of development.--From abstr.

77-001195 Webb, P. W. THE EFFECT OF SIZE ON THE FAST-START PERFORMANCE OF RAINBOW TROUT /SALMO GAIRDNFRI/, AND A CONSIDERATION OF PISCIVOROUS PREDATOR-PREY INTERACTIONS. J. Exp. Biol. 65 (1): 157-177. Aug. 1976. SFA 22(3)

[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109] The fast-start (acceleration) performance of seven groups of rainbow trout from 9.6 to 38.7 cm total length was measured in response to d.c. electric shock stimuli. The duration of the primary acceleration stages increased with size from 0.07 s for the group of smallest fish to 0.10 s for the group of largest fish. Acceleration rates were independent of size. The overall mean maximum rate was 3438 cm/s² and the average value to the end of the primary acceleration movements was 1562 cm/s². The distance covered and velocity attained after a given time for fish accelerating from rest were independent of size. The results are discussed in the context of interactions between a predator and prey fish following initial approach by the predator. It is concluded that the outcome of an interaction is likely to depend on reaction times of interacting fish responding to manoeuvres initiated by the predator or prey. The prey reaction time results in the performance of the predator exceeding that of the prey at any instant. The predator reaction time and predator error in responses to unpredictable prey manoeuvre are required for prey escape. It is predicted that a predator should strike the prey within 0.1 s if the fish are initially 5-15 cm apart as reported in the literature for predator-prey interactions. These distances would be increased for non-optimal prey escape behavior and when the prey body was more compressed or depressed than the predator.--From summ.

77-001196 Werner, E. F.; Hall, D. J.; Laughlin, D. R.; Wagner, D. J.; Wilsmann, L. A.; Funk, F. C. HABITAT PARTITIONING IN A FRESHWATER FISH COMMUNITY. J. Fish. Res. Board Can. 34 (3): 360-370. Mar. 1977. In English with French summ. SFA 22(3)

[Kellogg Biol. Stn., Mich. State Univ., Hickory Corners 49060]

77-001197 Wootton, R. J. CHANGES IN THE COURTSHIP BEHAVIOUR OF FEMALE THREE-SPINED STICKLEBACKS BETWEEN SPAWNINGS. Anim. Behav. 22 (4): 850-855. Nov. 1974. SFA 22(3)

[Dep. Zool., Univ. Coll. Wales, Aberystwyth, Wales] In the interval between successive spawnings, female three-spined sticklebacks showed an initial decline in their tendency to show courtship behaviour in response to a courting male, as the time of next spawning approached this tendency recovered. The head-up and slight following response persisted longest and was the first to reappear. The behavioural changes were due primarily to changes intrinsic to the female rather than changes in the males' courtship behaviour.

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77-001198 Zottoli, S. J. COPRELATION OF THE STARTLE REFLEX AND MAUTHNER CELL AUDITORY RESPONSES IN UNRESTRAINED GOLDFISH. J. Exp. Biol. 66: 243-254. Feb. 1977. SFA 22(3)
[Res. Inst. Alcohol., 1021 Main St., Buffalo, NY 14203]

LIFE HISTORIES-GENERAL WORKS

77-001199 Armstrong, J. W.; Liston, C. R.; Tack, P. I.; Anderson, P. C. AGE, GROWTH, MATURITY, AND SEASONAL FOOD HABITS OF POUND WHITEFISH, /PROSOPIUM CYLINDRACEUM/, IN LAKE MICHIGAN NEAR LUDINGTON, MICHIGAN. Trans. Am. Fish. Soc. 106 (2): 151-155. Mar. 1977. SFA 22(3)
[Coll. Fish., Univ. Wash., Seattle 981951]

77-001200 Beamish, F. W. H.; Potter, I. C. THE BIOLOGY OF THE ANADROMOUS SFA LAMPREY (/PETROMYZON MARINUS/) IN NEW BRUNSWICK. J. Zool. (Lond.) 177 (1): 57-72. Sept. 1975. SFA 22(3)
[Dep. Zool., Univ. Guelph, Guelph, ON, Canada] Samples of larvae, metamorphosing and adult representatives of anadromous /Petromyzon marinus/ were collected from rivers in New Brunswick to provide data on aspects of its life cycle. Length-frequency curves for ammocoetes indicate that in general the duration of larval life is from six to eight years. Metamorphosis is initiated in mid-July and has probably been completed by November, paralleling the situation in the landlocked Sea lamprey. Small adults of variable size (167-351 mm) attack Alewives (/Pomolobus pseudoharengus/) and Atlantic salmon (/Salmo salar/) in the St. John River at points up to 120 km from the estuary. The data indicate that some individuals start feeding in the winter while others do not commence parasitism until the late spring and that this species does not always migrate downstream to saline conditions immediately after metamorphosis. In a sample of 285 nearly mature upstream migrants caught at the Mactaquac Dam on the St. John River, the ratio of females:males was 1:1.18. No significant difference was found between the mean length, weight and number of trunk myomeres of the two sexes. The mean number of eggs per female was 210,228. Spawning takes place in late June/early July when the animals show a sexual dimorphism in body proportions and undergo a reduction in total length. The post-larval phase of the life cycle is considered to last for three or four years, one or two years longer than that recorded for the landlocked form.--From abstr.

77-001201 Behnke, R. J.; Zarn, M. BIOLOGY AND MANAGEMENT OF THREATENED AND ENDANGERED WESTERN TROUTS. U.S. For. Serv. Gen. Tech. Rep. RM-28. 45p. 1976. SFA 22(3)
[Colo. State Univ., Fort Collins 80523] Discusses taxonomy, reasons for decline, life history and ecology, and suggestions for preservation and management of six closely related trouts native to western North America: Colorado River Cutthroat, /Salmo clarki pleuriticus/; greenback trout, /S. c. stomias/; Lahontan cutthroat, /S. c. henshawi/; Paiute trout, /S. c. seleniris/; Gila trout, /S. gilae/; and Arizona native trout, /S. apache/. Meristic characters, distribution and status, habitat requirements and limiting factors, protective measures, and management recommendations are presented for each taxon.

77-001202 Bennett, D. F.; Wydoski, R. S. BIOLOGY OF THE REDTAIL SURFPERCH (*AMPHISTICHUS RHODOTERUS*) FROM THE CENTRAL OREGON COAST. U.S. Fish Wildl. Serv. Tech. Pap. 90. 23p. 1977. SFA 22(3)

[Fish. Comm. Oreg., Clackamas 971051] Data on certain aspects of the life history of the redbtail surfperch, *Amphistichus rhodoterus*, were collected along the central coast of Oregon, from April 1967 through April 1969. Annulus formation occurred during February through June, usually earlier in young than in older fish. The longest of 774 surfperch captured was 375 mm in total length, the heaviest weighed 1, 125 g, and the oldest was in age-group IX. Females older than age group II grew faster than males of the same ages. Males first matured at ages II and III and females at ages III and IV. Sex ratios appeared to be 1:1. Mating occurred from late December to early January, and the young were born from July through September. The number of embryos per female ranged from 1 to 39 (mean, 13.3) and increased linearly with the length and weight of the females. Mean size of embryos was positively correlated with size of the female throughout the gestation period. Estimated mortality of embryos was slightly more than 1 percent. Food of fish from the surf zone included crustaceans (by far the most important group in both frequency of occurrence and total volume) and (in order of decreasing importance) fishes, mollusks, and polychaetes. Parasites of the redbtail surfperch were immature nematodes (*Anisakinae*); the digenetic trematode, *Genitocotyle acirra*; the monogenetic trematode, *Diclidophora* sp.; and the copepods, *Caligus* sp., *Clavella* sp., and *Argulus catostomi*.

77-001203 Bortone, S. A. OBSERVATIONS ON THE LIFE HISTORY OF *DIPLECTRUM PACIFICUM* AND *D. MACROPOMA* (PISCES, SERRANIDAE) FROM THE BAY OF PANAMA. Pac. Sci. 31 (1): 49-60. Jan. 1977. SFA 22(3)

[Fac. Biol., Univ. West Fla., Pensacola 325041] *Diplectrum pacificum* and *D. macropoma* were collected in abundance from January through February 1973 at a depth of 20-30 m in the Bay of Panama. Juvenile *D. pacificum* apparently occur in shallow water (less than 2 m). The substrate where adults of both species occur sympatrically is fine sand and silt bottom with some shell. Both species display nearly identical negative allometric growth. *Diplectrum pacificum* reaches a maximum size of 219 mm standard length. The oldest specimens were from age-group 6. *Diplectrum macropoma* attains a maximum size of 130 mm standard length. The oldest specimens were from age-group 4. Both species tend to aggregate in definite size groups. Both species feed predominately on small shrimp and other crustaceans. *Diplectrum pacificum* tends to select larger shrimp than does *D. macropoma*. Reproductively, both species are synchronous hermaphrodites. Testicular tissue is restricted to a morphologically distinct, species-specific area. Mature eggs pass into an ovarian sinus before being deposited. Sperm and ovarian ducts exit separately. No evidence was found of internal self-fertilization in either species. Behaviorally, both species show an affinity for the substrate and display color patterns that are similar to the active-inactive color pattern described for another related species, *D. formosum*.

77-001204 Burkov, A. I.; Solovkina, L. N. THE MAIN COMMERCIAL AND BIOLOGICAL INDICATORS OF THE OMUL, *COREGONUS AUTUMNALIS*, FROM THE NORTH EUROPEAN ZOOGEOGRAPHIC REGION, AND THE RESULTS OF TAGGING. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 327-331. 1976. SFA 22(3)

[Sevrybvod, Arkhangel, USSR]

77-001205 Chao, L. N. ASPECTS OF SYSTEMATICS, MORPHOLOGY, LIFE HISTORY AND FEEDING OF WESTERN ATLANTIC SCIAENIDAE (PISCES: PERCIFORMES). Ph.D. dissertation, Coll. William and Mary in Va. 351 p. 1976. From Diss. Abstr. Int. P. Sci. Eng. 37(5), 1976. SFA 22(3)

The sciaenids of the western Atlantic consist of 21 genera and 56 species placed in 11 supra-generic groups. The phylogenetic relationships of all western Atlantic genera are assessed on the basis of swimbladder, otolith (sagitta and lapillus) and external morphology. A tested field key to species and genera of all western Atlantic sciaenids is included. The range of distribution and some meristic counts are listed under each species. Six sciaenid species were examined for their food habits and functional morphology of feeding apparatus. The mouth position, dentition, gill rakers, digestive tract, pores and barbels, nares and body shape were found to be important for these sciaenids in locating and ingesting prey in the water column. Stomach contents indicated that the food partitioning of these six species was closely correlated with the habitat where each species was adapted to feed in.--From abstr.

77-001206 Denoncourt, P. F.; Hocutt, C. H.; Stauffer, J. P., Jr. NOTES ON THE HABITAT, DESCRIPTION AND DISTRIBUTION OF THE SHARPNOSE DARTER, /PERCINA OXYRHYNCHA/. Copeia 1977 (1): 168-171. 16 Mar. 1977. SFA 22(3)

[Dep. Biol. Sci., York Coll. Pa., York 174051]

77-001207 Druzhinin, A. D. NOTES ON THE ECOLOGY OF /CALAMUS BRACHYSOMUS/ (PISCES, SPARIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 317-319. 1976. SFA 22(3)

[VNIRO, Moscow, USSR]

77-001208 Durbin, A. G. THE ROLE OF FISH MIGRATION IN TWO COASTAL ECOSYSTEMS: 1. THE ATLANTIC MENHADEN, /BREVOORTIA TYRANNUS/, IN NARRAGANSETT BAY, R.I. 2. THE ANADROMOUS ALEWIFE, /ALOSA PSEUDOHARENGUS/, IN RHODE ISLAND PONDS. Ph.D. dissertation, Univ. P. I. 235 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

The ecological impact of the anadromous alewife upon fresh water communities is in complete contrast to that of the menhaden in Narragansett Bay. Sea-run alewives do not feed while in fresh water, and through mortality, excretion, and the release of spawning products they contribute substantial amounts of nutrients of marine origin to fresh water systems. Thus the alewife acts as a nutrient source to the system, rather than merely as a means of nutrient regeneration. Microcosm experiments, and the incubation of autumn leaf litter in alewife and non-alewife streams demonstrated that the most lasting result of an alewife migration is an increase in benthic, rather than plankton, production. While the menhaden may remove a large fraction of the food production of a system, the alewife tends to increase the total food production. The nutrient input from the parent fish greatly exceeds the eventual nutrient loss to the system from the seaward migration of juvenile alewives.--From abstr.

77-001209 Gaigher, I. G. THE ECOLOGY OF A MINNOW, /BARBUS TREVELYANI/ (PISCES, CYPRINIDAE) IN THE TYUME RIVER, EASTERN CAPE. Ann. Cape Prov. Mus. Nat. Hist. 11 (1): 1-19. 30 Sept. 1975. SFA 22(3)

[Dep. Zool., Univ. Port Hare, South Africa] The minnow /Barbus trevelyani/ Gunther, is known today only from restricted habitats in the Buffalo River and Tyume River, Eastern Cape. The ecology of this species has been studied and it is concluded that /Barbus trevelyani/ is in danger of extinction due to deterioration of the habitat, and the presence of introduced exotic species.

77-001210 Gordon, J. D. M. THE FISH POPULATIONS IN INSHORE WATERS OF THE WEST OF SCOTLAND. THE BIOLOGY OF THE NORWAY POUT (/TRISOPTERUS ESMARKII/). J. Fish Biol. 10 (5): 417-430. May 1977. SFA 22(3)

[Dunstaffnage Mar. Res. Lab., P.O. Box 3, Oban, Argyll, Scotland] Norway pout (/Trisopterus esmarkii/) were collected during a trawling survey of inshore waters of the west coast of Scotland. 0-group fish were first taken by the bottom trawl in late summer and since there was no evidence of local spawning it was inferred that a migration from the open sea had occurred. The distribution and age composition of the stock was related to depth. The young fish migrated from the shallower stations during their first winter but persisted for a second winter at some of the deeper stations. There was a marked seasonal variation in the quality of the diet and in the intensity of feeding. The most important food organisms were copepods, decapod larvae, Mysids and euphausiids. Diurnal variations in the intensity of feeding were minimal in August but the quality of the food in the stomachs was dependent on the time of sampling. The converse was observed in January when feeding was at a maximum between dusk and dawn but the quality of the food remained fairly constant.

77-001211 Grimes, C. B. CERTAIN ASPECTS OF THE LIFE HISTORY OF THE VERMILLION SNAPPER /RHOMBOPLETIS APOBUEENS/ (CUVIER) FROM NORTH AND SOUTH CAROLINA WATERS. Ph.D. dissertation, Univ. N. Car. (Chapel Hill). 251 p. 1976. From Diss. Abstr. Int. B. Sci. Eng. 37(8), 1977. SFA 22(3)

The vermilion snapper, the most frequently occurring lutjanid off the Carolinas, is distributed from Cape Hatteras, N.C. and Bermuda south to southeastern Brazil, through the West Indies and Gulf of Mexico. The species occurs in two distinct habitats of the North and South Carolina outer Continental Shelf. The shelf-edge habitat, where they are concentrated, is located at the Continental Shelf break 35-100 fm (64-480 m) deep. Inshore "life bottom" habitat consists of scattered rock and coral outcroppings located on the open Continental Shelf in 14-30 fm (26-56 m). The northward flowing Gulf Stream and drowned pleistocene reef at the shelf-break provide a stable warm deep coral-reef habitat. Vermilion snapper were found associated with 112 species of mostly tropical and sub-tropical fishes. The species is one of the smaller members of the family Lutjanidae, attaining a maximum size of about 600-mm total length (TL) and 2800 g. Seasonal occurrence of maturing ova, frequency distributions of ovum diameters and seasonal progression of gonadal condition index indicated multiple spawning by females occurs from late April or May through September. Most females spawn their fourth season at 350-400-mm TL; however a few females spawn their third year at 250-300-mm TL. Sex ratios change as fish grow larger and older. Sex ratio is equal for fish less than 150-mm TL but thereafter it increases to approximately 60 percent females until about 500-mm TL when the percentage of females steadily increases. Fecundity ranges from 8,168 to 1,789,998 ova for 244-mm and 557-mm TL females. The diet of adults and large juveniles consists of small pelagic organisms. Age and growth studies using scales and

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otoliths show males and females to grow about the same until age 8. Females continue to grow until at least age 10 but no males older than 8 appeared in samples.--From abstr.

77-001212 Grimes, C. B.; Manooch, C. S. III; Huntsman, G. R.; Dixon, R. L. RED SNAPPERS OF THE CAROLINA COAST. Mar. Fish. Rev. 39 (1): 12-15. Jan. 1977. SFA 22(3)

[NMFS, Atl. Estuarine Fish. Cent., Beaufort, NC]

77-001213 Hartmann, J. DER BARSCH (/PERCA FLUVIATILIS/) IM EUTROPHIERTEN BODENSEE. [THE PERCH (/PERCA FLUVIATILIS/) IN THE EUTROPHICATED LAKE OF CONSTANCF.] Arch. Hydrobiol. 76 (3): 69-286. Nov. 1975. In German with English summ. SFA 22(3)

[Inst. Seenforsch. Fischereiwes. Langenargen/Konstanz, West Germany] Since the eutrophication of the Lake of Constance, the abundance of plankton has caused changes in the habits and biology of /Perca fluviatilis/ and of other species. It is assumed that, to some extent, the present abundance of plankton protects the young fishes against being eaten by larger ones. No results support the hypothesis that /P. fluviatilis/ interferes with /Coregonus lavaretus wartmanni/. Very good growth is possible even when the amount of fish in the diet is small. The annual cycles of the stomach contents, length, weight, age, sex composition in the catches, growth, and distribution differ in the age groups and/or the two sexes.

77-001214 Hogarth, W. T. LIFE HISTORY ASPECTS OF THE WAHOO /ACANTHOCYBIUM SOLANDRI/ (CUVIER AND VALENCIENNES) FROM THE COAST OF NORTH CAROLINA. Ph.D. dissertation, N. Car. State Univ. (Paleigh). 119 p. 1976. From Diss. Abstr. Int. B Sci. Enq. 37 (9), 1977. SFA 22(3)

Scales, vertebrae, and otoliths were examined to determine the age of wahoo. Otolith growth rings were considered valid means of aging wahoo. The relationship between body length and otolith radius is described. The relationship of total length to fork length and to caudal fin spread is discussed. Length-weight relationships for males and females were tested, and since there are no differences in these relationships the species relationship is derived. Length-weight relationships are described for taxidermy data from Bermuda, Ocean City, Maryland, Freeport, Bahamas, Florida, and the Caribbean. A Walford graph is presented to show the maximum attainable length. Data indicate wahoo spawn off the coast of North Carolina in July and August. Wahoo attain maturation at 86 cm (TL) for males and 101 cm (TL) for females. The estimated number of eggs per fish ranged from 560,000 for a 6.13 kg wahoo to 45,340,000 in a 39.5 kg with no apparent difference in ovaries. The food habits indicate that the wahoo is a nonselective feeder on fish available in the Gulf Stream. Parasites were observed and recorded. The sex ratio indicates a predominance of females in the charter boat catches. Mercury analyses are discussed. Annual mortality rates by two methods are described. The exploitation of wahoo by sport fishing boats in Hatteras and Oregon Inlet, North Carolina is described for the years 1964 through 1972. This catch per unit effort data show that the great abundance of the sport catch along the Dare County coast is made during July and August.--From abstr.

77-001215 Horn, M. H. OBSERVATIONS ON FEEDING, GROWTH, LOCOMOTOR BEHAVIOR, AND BUOYANCY OF A PELAGIC STROMATEOID FISH, /ICHTHYS LOCKINGTONI/. NOAA Fish. Bull. 75 (2): 453-456. Apr. 1977. SFA 22(3)

[Dep. Biol., Calif. State Univ., Fullerton 92634]

77-001216 Hosie, M. J.; Horton, H. F. BIOLOGY OF THE REX SOLE, /GLYPTOCEPHALUS ZACHIRUS/, IN WATERS OFF OREGON. NOAA Fish. Bull. 75 (1): 51-60. Jan. 1977. SFA 22(3)

[Oreg. Dep. Fish Wildl., Mar. Field Lab., P.O. Box 5430, Charleston 97420] Data are presented on the life history and population dynamics of rex sole, /Glyptocephalus zachirus/ Lockington, collected from Oregon waters between September 1969 and October 1973. Length-weight relationships vary little between sexes or with time of year. Otolith annuli form primarily from January through May and were used for age determination. Age and length are highly correlated ($r = 0.9945$ for males and 0.9864 for females), with females growing faster and living longer than males. Estimates of total instantaneous mortality rate (Z) appear less variable when calculated by the catch-curve method (mean Z of 0.64 for males and 0.51 for females), than by the Jackson method. Age at 50 percent maturity occurs at 16 cm (about 3 yr) for males and at 24 cm (about 5 yr) for females. Spawning off northern Oregon occurs from January through June, with a peak in March-April. Fecundity is correlated ($r = 0.9620$) with length of fish. There were 15 recaptures (0.59 percent) from 2,537 fish tagged off northern Oregon during March and June 1970. Maximum movement of recaptured fish was only 53.9 km, but the low recovery precludes definite conclusions. Twenty loci were detected by starch-gel electrophoretic analysis using rex sole muscle tissue. Of these, three loci were polymorphic, but showed no discernible variation between collections from northern, central, and southern Oregon in April 1973.

77-001217 Infante, O.; LaBar, G. W. SOME ASPECTS OF THE BIOLOGY OF /PETENIA KRAUSSII/ STEINDACHNER (PISCES: CICHLIDAE) IN LAKE VALENCIA, VENEZUELA. J. Fish Biol. 10 (3): 243-249. Mar. 1977. SFA 22(3)

[Escuela Biol., Fac. Cienc., Univ. Cent. Venezuela, Caracas, Venezuela] /Petenia kraussii/ Steindachner (Pisces: Cichlidae) was collected from Lake Valencia, Venezuela from April 1973 to April 1974. A total of 457 specimens were examined for stomach contents, and 471 were analyzed for length-weight relationship, sexual condition including fecundity and parasitism. /P. kraussii/ is primarily a plankton feeder when small and utilizes benthic invertebrates after attaining about 10 cm standard length. The larvae of a benthic ephemeropteran, /Campsurus/ sp. (Hexagenidae) was the most important single food item with gastropods and fish eggs also being found consistently in stomachs. No mature male fish were found, and only 17 of 471 fish could be identified as males, while 157 were females. Gravid females contained an estimated mean of 6266 eggs and matured at about 18 cm standard length and 100 g live weight. It was not possible to determine age from either scale or otoliths.

77-001218 Kennedy, S. E. LIFE HISTORY OF THE LEON SPRINGS PUFFFISH, /CYPRINODON BOVINUS/. Copeia 1977 (1): 93-103. 16 Mar. 1977. SFA 22(3)

[Texas Gen. Land Off., 1700 N. Congress, Austin 78701] /Cyprinodon bovinus/ experiences a peak in maturity index and mean egg diameter in mid-July; peak frequency of the fish's occurrence in nature occurs in October. Analysis of size-class frequency distribution indicates that individuals live for 20-23 months and participate in only one spawning period. A conspicuous drop in the pupfish populations occurs in winter

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at stations altered by oil drilling activities. The population decrease is attributed to reduced primary production. /*C. bovinus*/ exhibits a peak in spawning from 1000 to 1030 hrs, followed by a less conspicuous peak at 1800-1900 hrs. Thermal tolerance is shown to be somewhat lower than tolerances determined for other desert pupfishes. Morning tolerances are significantly different from afternoon tolerances. /*C. bovinus*/ is a generalist in food habits, feeding primarily on diatoms, amphipods, and ostracods. Pit-digging is discussed as a behavioral adaptation for feeding. It is recommended that /*C. bovinus*/ be removed from the United States Department of the Interior's list of extinct United States species and be reclassified as a threatened species.--From abstr.

77-001219 Kirillov, A. P. A MORPHOLOGICAL AND ECOLOGICAL DESCRIPTION OF THE TAIMEN, /*HUCHO TAIMEN*/, OF THE ANABAR RIVER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 150-152. 1976. SFA 22(3)

[Acad. Sci., Yakutsk, USSR]

77-001220 Kovtun, I. P. MATERIALS ON THE ECOLOGY OF THE GOBY, /*POMATOSCHISTUS MICRIPS LEOPARDINUS*/, FROM THE SEA OF AZOV. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 28-34. 1976. SFA 22(3)

[AzNIIRKh, Rostov-on-Don, USSR] The range of /*Pomatoschistus microps leopardinus*/ in the Sea of Azov is confined to areas with a salinity of more than 10‰. The largest fish attain 75 mm; they become sexually mature at a length of 25 mm. In spring the population consists only of fish born the previous year. In October two age groups are already noted in catches, namely underyearlings and yearlings. However the share of the latter (on average for 1975-1973) is only 19.6 percent. Spawning takes place from May to August. The eggs are laid on the valves of the shells of dead molluscs. Spawning is intermittent. The fecundity varies from 1309 to 3163 eggs. The larvae lead a pelagic existence and they feed on zooplankton during the first development stanzas.

77-001221 Laale, H. W. THE BIOLOGY AND USE OF ZEBRAFISH, /*BRACHYDANIO FERRIS*/ IN FISHERIES RESEARCH. A LITERATURE REVIEW. J. Fish Biol. 10 (2): 121-173. Feb. 1977. SFA 22(3)

[Dep. Zool., Univ. Manitoba, Winnipeg, MB, Canada]

77-001222 Mac Elwain, W. THE MISUNDERSTOOD MORAYS. Sea Front. 23 (2): 96-100. Mar.-Apr. 1977. SFA 22(3)

77-001223 Macer, C. T. SOME ASPECTS OF THE BIOLOGY OF THE HORSE MACKEREL (/*TRACHURUS TRACHURUS*/ (L.)) IN WATERS AROUND BRITAIN. J. Fish Biol. 10 (1): 51-62. Jan. 1977. SFA 22(3)

[Minist. Agric. Fish. Food, Fish. Lab., Lowestoft, Suffolk, England] Evidence is presented which supports the hypothesis of a seasonal migration between the North Sea and the western English Channel. Fish caught west of Britain have a different length composition and there is some evidence of a North-South migration. Analysis of stomach contents shows that the species is a plankton feeder. Data on seasonal growth in young fish show the growth-rate is most rapid between August and December; length-frequency distributions of two year-classes were bimodal. The use of the otolith burning technique revealed up to 35 check rings, as compared with the reported maximum age of 10 years. With the exception of ring numbers 1 to 3, it could not be established

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the rings were annual.

77-001224 Maeda, T.; Hirakawa, H. [SPAWNING GROUNDS AND DISTRIBUTION PATTERN OF THE ALASKA POLLACK IN THE EASTERN BERING SEA.] Bull. Jpn. Soc. Sci. Fish. 43 (1): 39-45. Jan. 1977. In Japanese with English summ. SFA 22(3)

[Pac. Fish., Hokkaido Univ., Hokodati, Japan] In 1972 and 1973, the spawning grounds of the Alaska pollack were divided into two parts by the shallow part of the Pribilof Islands and the sea valley of the south-eastern part of the islands. The center part of the spawning grounds was formed in the north-western area of the Unimak Island and the south-western area of the Pribilof Islands. In addition to these, the authors wish to infer that other spawning grounds were formed in the near continental slope of the north western area of the Pribilof Islands as observed from the distribution of the spawning fish and the larvae. The sex ratio of the fish varied at each station. The male fish predominated in comparison with the female fish at the center part of the spawning grounds in the shallow part, but the male fish showed a slight decrease with the distance from the center part, and the female fish at the wintering grounds in the deep sea areas were more numerous than the male fish.--From abstr.

77-001225 Mahood, F. K. SPOTTED SEATROUT IN COASTAL WATERS OF GEORGIA. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 195-207. 1975[1976]. SFA 22(3)

[Ga. Dep. Nat. Resour., P.O. Box 1676, Brunswick 31520] Various aspects of the life history of spotted seatrout in Georgia were studied. Females comprised 63.2 per cent and males 36.8 per cent of all fish examined. Spotted seatrout moved from the shallow waters of the estuaries to deeper waters in the creeks and rivers during periods of high and low water temperature. Spawning occurred in the shallow waters in all sectors of the estuaries including the beaches near inlets. Food items found in the stomachs of spotted seatrout consisted of 53.9 per cent fish, 44.9 per cent shrimp and 0.8 per cent squid.

77-001226 Maksimov, V. A. THE ECOLOGY OF THE KAMCHATKA TROUT /SALMO MYKISS/ POPULATION FROM THE BOL'SHAYA RIVER (WESTERN KAMCHATKA). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 12-17. 1976. SFA 22(3)

[Dep. Ichthyol., Moscow State Univ., USSR] The migration of the diadromous Kamchatka trout to overwinter and spawn in the Bol'shaya River occurs from the end of August to November. A spring migration is not excluded. The spawning of both the diadromous and resident form is observed from April to June. The age of spawners is 4-9 years. 5-6 year old fish constitute the basis of the spawning stock. In the Bol'shaya River there is probably a common ancestral migratory stock of Kamchatka trout, represented by typically diadromous fish which go far into the sea, coastal fish which feed close to the coast and river fish which do not enter the sea. The growth rate of typically diadromous fish is higher than that of river fish. The downstream migration into the sea of the young of the diadromous form from the southern rivers occurs one year later than from the northern rivers which represent smaller watersheds. Within the range, the northern populations of the diadromous form are characterized by a higher growth rate, and later and shorter times of migration and spawning than the southern populations. The ecological heterogeneity of the populations of Kamchatka trout enables the species to fully utilize the varied habitats of the Kamchatka peninsula.--Concl.

77-001227 McCosker, J. E. THE FEL GENUS /*PHAENOMONAS*/ (PISCES, OPHICHTHIDAE). Pac. Sci. 29 (4): 361-363. Oct. 1975. SFA 22(3)
[Steinhart Aquarium, Golden Gate Park, San Francisco, CA 94118]

77-001228 Miller, P. J. AGE-STRUCTURE AND LIFE-SPAN IN THE COMMON GOBY, /*POMATOSCHISTUS MICROPS*/. J. Zool. (Lond.) 177 (3): 425-448. Nov. 1975. SFA 22(3)

[Zool. Dep., Univ. Bristol, England] Age-structure and longevity in the euryhaline Common goby, /*Pomatoschistus microps*/ (Krover), has been studied by monthly sampling of estuarine and shore populations in the Isle of Man and in collections from other parts of the British Isles. Age of individuals was determined by examination of caudal peduncle scales, where time of annulus formation was confirmed from monthly changes in mean terminal sclerite width and in frequency of scale-types. After the first winter of life, an annulus of narrow sclerites is produced on resumption of growth in spring and a separate summer annulus, corresponding with a growth retardation during the peak breeding season, is laid down usually in June. Maximum age did not exceed 21-26 months, with most adult fishes dying in the second autumn of life a few months after their first breeding season (within possible age-limits of 17-20 months). Seasonal migration is discussed with reference to the downstream movement of estuarine /*P. microps*/ when sexually mature after the first winter of life, the winter distribution relative to temperature, and the preference of newly demersal young for less saline parts of the estuary. Cases of mortality from predation and environmental extremes are listed. The question of senescence in relation to life-history pattern and survival in /*P. microps*/ and some other teleosts is discussed with special reference to gonad maturation and spawning, and the attainment of limiting size.

77-001229 Woshin, A. K. M.; Gallaway, B. J. SEASONAL ABUNDANCE, DISTRIBUTION, FOOD HABITATS AND CONDITION OF THE SOUTHERN BROOK LAMPREY, /*ICHTHYOMYZON GAGEI*/ HUBBS & TRAUTMAN, IN AN EAST TEXAS WATERSHED. Southwest. Nat. 22 (1): 107-114. 1 Mar. 1977. SFA 22(3)

[LGL Limited-U.S., Inc., 103A Pleasant St., Bryan, TX 77801] Samples of fishes containing representatives of the southern brook lamprey were collected quarterly from five stream stations in the Mill Creek drainage, northeast Newton County, Texas using a back-pack shocking device. Southern brook lampreys were more abundant in tributaries than in the mainstream and were observed to prefer slack water areas with decomposing materials. They utilized plankton and detritus as food. They were in better condition in fall than in summer, and also heavier at a given length during spring than winter. These differences appeared related to quantity and quality of food and probably were also affected by changes related to transformation.

77-001230 Musick, J. A.; Mercer, L. P. SEASONAL DISTRIBUTION OF FLACK SEA BASS, /*CENTROPOMISTIS STRIATA*/, IN THE MID-ATLANTIC BIGHT WITH COMMENTS ON THE ECOLOGY AND FISHERIES OF THE SPECIES. Trans. Am. Fish. Soc. 106 (1): 12-25. Jan. 1977. SFA 22(3)
[Va. Inst. Mar. Sci., Gloucester Point 23062]

77-001231 Nelson, W. R. STUDIES ON THE CROAKER, /MICROPOGON UNDULATUS/ LINNAEUS, AND THE SPOT, /LEIOSTOMUS XANTHURUS/ LACEPEDE, IN MOBILE BAY, ALABAMA. J. Mar. Sci. 1 (1): 4-92. 1969. SFA 22(3)

Thirty-two otter trawl stations were sampled at least bi-monthly in Mobile Bay from May, 1963 through April, 1964. Two hundred and sixty-four samples, with concomitant hydrographic data were collected. General salinity and temperature conditions within the bay are discussed. Data on the spawning period, spawning location, age, growth, movement, abundance, seasonal distribution and relation to salinity, temperature, and depth of the croaker, /Microgogon undulatus/ Linnaeus, and the spot, /Leiostomus xanthurus/ Lacepede in Mobile Bay are presented and discussed. Offshore data on the croaker and spot allow the study of three age classes from spawning until the two species are in their third year of age. The estuary is utilized by both species until they reach maturity, at which time they go offshore to spawn.

77-001232 Westerov, A. A.; Shiganova, T. A. THE EGGS AND LARVAE OF THE ATLANTIC SAURY, /SCOMBERESOX SAURUS/ OF THE NORTH ATLANTIC. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 277-283. 1976. SFA 22(3)

[AtlantNIPO, Kaliningrad, USSR] The geographical and vertical distribution of eggs and larvae of the Atlantic saury, /Scomberesox saurus/, and also some of their living conditions (temperature and salinity) are examined. A description of the embryonic development and the initial post-embryonic development of the Atlantic saury is described.

77-001233 Payne, A. I. THE REPRODUCTIVE CYCLE, CONDITION AND FEEDING IN /PARBUS LIBERIENSIS/, A TROPICAL STREAM-DWELLING CYPRINID. J. Zool. (Lond.) 176 (2): 247-269. June 1975. SFA 22(3)

[Dep. Biol. Stud., Lanchester Polytech., Coventry, England] This investigation examines the biology of /Parbus liberiensis/, a small cyprinid living in the forest streams of Sierra Leone and Liberia, in relation to seasonal changes in the environment. The population studied showed a single discrete breeding season coinciding with the early part of the rains. Maturing fish previously marked moved upstream at this time. The pattern of gonad development is analysed and the relationship of fecundity to body size is defined numerically. The total and somatic (i.e. excluding gonad weights) condition of the fishes, relative to the length/weight data in September-November when the gonads are resting, reach a peak at spawning time for both mature males and females and for immature fish. The pattern of condition during a year differs in the two sexes. /P. liberiensis/ consumes a wide variety of foods but relies largely on insects and higher plant fragments. Debris from the forest canopy is an important source of nutriment. The fish feed, during the daytime and possibly at night, throughout the year. Experiments to determine the rate at which food passes through the gut are described and show that food passage is rapid. The seasonal cycles in condition and reproduction are discussed in relation to cycles in some other tropical and temperate riverine fishes.



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77-001234 Pearcy, W. G.; Hosie, M. J.; Richardson, S. L. DISTRIBUTION AND DURATION OF PELAGIC LIFE OF LARVAE OF DOVER SOLE, /MICROSTOMUS PACIFICUS/; REX SOLE, /GLYPTOCEPHALUS ZACHWYSS/; AND PETRALE SOLE, /EOPSETTA JORDANI/, IN WATERS OFF OREGON. NOAA Fish. Bull. 75 (1): 173-183. Jan. 1977. SFA 22(3)

[Sch. Oceanogr., Oreg. State Univ., Corvallis 97331] Dover and rex sole larvae attain an exceptionally large size and have a long pelagic life. Dover sole larvae (9-65 mm standard length) were collected in mid-water trawls and plankton nets during all months of the year. Judging from growth of larvae and occurrence in bottom trawls of recently metamorphosed juveniles, Dover sole are pelagic during their first year of life. Large larvae (50-65 mm standard length) are probably pelagic for over a year and few apparently are recruited to benthic populations. Dover sole larvae were most common in oceanic waters beyond the continental slope and in the upper 50 m of the water column. The rex sole larvae captured were 5-89 mm long. Average size and stage of development of larvae increased from March through February, and juveniles were common on the bottom during winter on the outer shelf. Thus the pelagic phase usually lasts about a year. Both rex and Dover sole may utilize the outer continental shelf-upper slope region for a nursery during early benthic life. Petrale sole larvae (10-22 mm standard length) were rare. They were collected only from March to June and appear to have a pelagic life of about 6 mo. Age-group 0 juveniles, uncommon in bottom trawl collections, were only captured on the inner continental shelf in the fall.

77-001235 Petrova, N. A. THE BIOLOGY OF THE INCONNU, /STENODUS LEUCICHTHYS NELMA/, FROM THE IRTYSH RIVER BASIN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 17-27. 1976. SFA 22(3)

[Siberian Fish. Res. Plan. Inst., Tyumen, USSR] Inconnu whose ages range from under-yearlings to 12th year fish (11+) are found in the Irtysh between Omsk and the mouth of the river. This allows it to be assumed that some of the fish do not migrate downstream to Ob' Bay and that consequently there are grounds for the creation of a local population. The bulk of the spawning stock consists of fish belonging to the semi-diadromous form and their migration in the Tobol'sk area takes place in August, and in the Omsk region in September-October. The males mature for the first time at an age of 4+, females at an age of 5+ to 6+. The inconnu spawning stock consists predominantly of first spawners aged 4+ to 6+. The absolute fecundity of the inconnu varies from 26 to 264 thousand eggs (on average 137 thousand eggs); the relative fecundity from 22 to 33 thousand eggs/kg. The present inconnu catches in the Irtysh River suffice to supply spawners for the first stage of operations in the Tobol' fish plant, provided that all females caught are fully used for fish rearing purposes. To ensure a more complete supply of spawners to the Tobol' fish plant, it would be expedient to organize the seining of inconnu in the Irtysh River above the mouth of the Tobol' River in the operational area of the fish plant.--From concl.

77-001236 Robertson, A. I. ECOLOGY OF JUVENILE KING GEORGE WHITING /SILLAGINODES PUNCTATUS/ (CUVIER & VALENCIENNES) (PISCES: PERCIFORMES) IN WESTERN PORT, VICTORIA. Aust. J. Mar. Freshwater Res. 28 (1): 35-43. Feb. 1977. SFA 22(3)

[Dep. Zool., Univ. Melbourne, Parkville, Vic. 3052, Australia] The growth rates, feeding and habitat preferences of juvenile /S. punctatus/ over seagrass flats (/Zostera muelleri/ and /Heterozostera tasmanica/) in Western Port, Victoria, were studied between June 1974 and January 1976. 0+ and 1+ age group fish were always present in the study area, whilst 2+ age group were present in small numbers from June 1974 to February 1975. Two equations

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describing the increase in weight of fish less than and greater than 7 months of age are given. The initial diet of the 0+ age group fish is harpacticoid copepods and amphipods, and the ghost prawn, *Callinassa australiensis*, is the major prey item of the older fish. Young 0+ age group fish were found to inhabit heavily grassed areas of the seagrass flats, whilst older fish preferred lightly grassed or bare, muddy areas. Adults of *S. punctatus* spawn in winter (May to July), probably in localized, shallow, subtidal areas of the bay. Post-larvae were first captured in the seagrass beds in September. The importance of these areas as nursery grounds for juveniles of *S. punctatus* is stressed.

77-001237 Robison, B. H. OBSERVATIONS ON LIVING JUVENILE SPECIMENS OF THE SLENDER MOLA, *Ranzania laevis* (PISCES, MOLIDAE). Pac. Sci. 29 (1): 27-29. Jan. 1975. SFA 22(3)

[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543]

77-001238 Pohr, B. A.; Gutherz, E. J. BIOLOGY OF OFFSHORE HAKE, *Merluccius albidus*, IN THE GULF OF MEXICO. NOAA Fish. Bull. 75 (1): 147-158. Jan. 1977. SFA 22(3)

[NMFS, Southeast Fish. Cent., P.O. Drawer 1207, Pascagoula, MS 39567] The species has been found from Georges Bank to Rio de Janeiro, Brazil, in 192 to 1,170 m. In the Gulf of Mexico it occurs in greatest abundance in the De Soto Canyon area in depths of 350 to 1,000 m. *Merluccius albidus* are segregated by size and sex on the continental slope with juveniles, males, and young females found in depths less than 550 m and large, mature females found in depths exceeding 550 m. Mature males were smaller than females and grew at a reduced rate following the onset of sexual maturity. Males and young females were found on the upper slope and older mature females found on the lower slope. Spawning appeared to take place on or near the bottom in 330 to 550 m. Spawning in the southern latitudes appears to occur from late spring to early fall and may be more protracted at the southern limits of its range. Eggs and the earliest larval stages have been described only for *M. albidus* from New England. *Merluccius albidus* are opportunistic feeders preying primarily on fishes, squid, and crustaceans. Fishes make up about 75 percent of their diet, with species of *Merlucciidae* and *Myctophidae* consumed most frequently. Prey species exhibited diel movement, but the similarity between day and night catch rates of *M. albidus* suggests that offshore hake do not move far off the bottom in pursuit of prey. Density estimates suggested a small population of *M. albidus* in the northern Gulf of Mexico. *Merluccius albidus* stocks 370 to 770 m on the De Soto Canyon slope north of Tampa, Fla., are estimated to be a minimum of 3.3×10^6 kg.--From abstr.

77-001239 Schaffer, W. M.; Elson, P. F. THE ADAPTIVE SIGNIFICANCE OF VARIATIONS IN LIFE HISTORY AMONG LOCAL POPULATIONS OF ATLANTIC SALMON IN NORTH AMERICA. Ecology 56 (3): 577-590. 1975. SFA 22(3)

[Dep. Biol., Univ. Utah, Salt Lake City 84112] In this paper variations in life history data among local populations of Atlantic salmon have been examined. The following patterns emerge: (1) The mean age of first spawning increases with the difficulty of upstream migration as estimated by the distance the fish ascend into freshwater. Other indices of river harshness yield similar results. (2) The effect of commercial fishing has been to eliminate larger and older fish from the run. Available evidence suggests that this has selected for an early age of first return on the Miramichi River and that the frequencies of genes coding for different ages of first spawning have been altered. (3) The mean age of first spawning is

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positively correlated with marine growth rates after the grilse stage. Rapid growth at sea subsequent to the gilse stage is associated with delayed reproduction; slower growth with an earlier age of first breeding. This result suggests different paths of high-seas migration.

(4) The variability about the mean age of first spawning first increases and then decreases as one moves north over the salmon's range from Maine to Ungava. In addition, we have observed that these results are in accord with predictions made by recent theoretical analyses of the optimal reproductive response to differing environmental conditions. We, therefore, conclude that the observed patterns of variation in life history are adaptive. We further take the agreement between theory and nature as a validation of the hypothesis that populations will in general differ from each other in the manner of their respective optima.

77-001240 Schmidt, R. F. THE DISTRIBUTION AND HABITAT OF /ETHEOSTOMA FUSIFORME/ WITH EMPHASIS ON SOUTHERN NEW ENGLAND. Ph.D. dissertation, Univ. Conn. 45 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

Ponds with vegetation and detrital sediments were preferred habitats for swamp darters. Stream populations were very small and probably depended on pond populations for recruitment. Vegetation was very important in providing cover for both species. Flows above 6 cm/sec affected distribution of both species but did not stress either. No competitive interactions between the two species were noted. Burying in the substrate by /E. olmstedii/, a possible method of predator avoidance, was inversely related to presence of vegetation. /E. fusiforme/ did not exhibit burying behavior and may be unable to avoid predation in the stream environment. Important food items in Connecticut were midges and cladocerans. Swamp darters with more than one annulus were never captured. There is some indication that New England swamp darters are evolving towards a bimodal spawning population. /E. fusiforme/ probably entered New England via the eastern tip of Long Island very late in postglacial time. The distribution in Connecticut is a result of postglacial drainage connections and slow expansion through extinct and extant intersystem connections.--From abstr.

77-001241 Varley, J. D.; Livesay, J. C. UTAH ECOLOGY AND LIFE HISTORY OF THE UTAH CHUB, /GILA ATRAPPIA/, IN FLAMING GORGE RESERVOIR, UTAH-WYOMING. Utah Div. Wildl. Res. Publ. No. 76-16. 29p. 1976. SFA 22(3)

Utah Div. Wildl. Resour., 1596 W. North Temple, Salt Lake City 84116 The Utah chub is an undesirable and problem fish species in numerous western lakes and reservoirs. The life history and ecology of the chub were studied in Flaming Gorge Reservoir from 1967 through 1971. Density of the species from the first year of impoundment (1963) through 1971 increased dramatically. Speculations are made as to when a population equilibrium would be reached. Body growth was nearly linear and was the fastest yet reported. Fecundity of chubs ranged from 4,900 eggs for a III+ female to 83,800 for V+ female. The species was euryphagic although distribution varied by season on plankton and filamentous green algae. The chub primarily inhabited the pelagic and littoral epilimnion although distribution varied by season and by age-group. The chub spawned amidst vegetation in the eulittoral zone. Suitable spawning habitat varying from marginal to prime made up 42.5 percent of the reservoir eulittoral. Male chubs were mature in their third year of life and most of the females spawned first at age four. Spawning began in June and was completed in August. Young females spawned earlier than older fish. Chub eggs required 130 Temperature Units to hatch in both field and laboratory experiments, which

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generally occurred in about 72 hours. Although density independent factors were observed to influence year-class strengths, population regulation appeared to be a density-dependent function in the first eight years of impoundment. Historically, the chub appears to have had a symbiotic relationship with *Salmo*. Speculations on how this relationship evolved and was maintained are made.

77-001242 White, M. I.; Chittenden, M. E., Jr. AGE DETERMINATION, REPRODUCTION, AND POPULATION DYNAMICS OF THE ATLANTIC CROAKER, *MICROPOGONIAS UNDULATUS*. NOAA Fish. Bull. 75 (1): 109-123. Jan. 1977. SFA 22(3)

[Dep. Wildl. Fish. Sci., Texas A & M Univ, College Station 77843] A validated scale method of age determination is described for the Atlantic croaker. Two age-classes were usually observed, but only one was abundant. Mean total lengths were 155-165 mm at age I and 270-280 mm at age II based on three methods of growth estimation. Fish matured near the end of their first year of life when they were about 140-170 mm total length. Spawning occurred from at least September through March but there was a distinct peak about October. Somatic weight-length relationships varied monthly, and changes appeared to be associated with maturation and spawning. Somatic weight reached a maximum in June, and the minimum was observed in March. Maximum somatic weight loss (24 percent) occurred in March, but no data were obtained from December through February. In estuaries, age 0 croaker apparently occupied soft-substrate habitat and older fish occurred near oyster reefs. Life spans were only 1 or 2 yr, and the total annual mortality rate was 96 percent. The above life history pattern appears similar for croaker found throughout the Carolinian Province. Contrasts are presented to illustrate differences in the life histories and population dynamics of croaker found north and south of Cape Hatteras, N.C. A parallel is drawn with apparently similar changes in the American shad, *Alosa sapidissima*, and the suggestion is made that changes in the population dynamics of species that traverse the Cape Hatteras area may represent a general phenomenon.

77-001243 Whyte, S. A. DISTRIBUTION, TROPHIC RELATIONSHIPS AND BREEDING HABITS OF THE FISH POPULATIONS IN A TROPICAL LAKE BASIN (LAKE BOSUMTWI-GHANA). J. Zool. (Lond.) 177 (1): 25-26. Sept. 1975. SFA 22(3)

[Zool. Dep., Univ. Ghana, Legon, Accra, Ghana] In the meteoritic crater lake--L. Bosumtwi--and its inflowing streams there are 11 species of fish which four are cichlids and one of these is endemic. The zonal distribution, feeding and reproductive habits, as well as morphological adaptations of the fish are described. The species show a remarkable zonation from the upper reaches of the permanent streams to the limnetic zone of the lake, with each species occupying a well defined habitat. The cichlid populations dominate the lacustrine environments, while the non-cichlids predominate in the riverine situations. This distribution pattern is related to the distribution of food resources, the availability of breeding sites and also to the possession of suitable body form or some behavioural characteristics. Despite the presence of two mouth brooding planktonic feeders in the lake, the need to spawn on a firm substrate, together with the surface feeding habit of the juvenile cichlids, makes none of the fish completely independent of the shallows. Cohabiting species show well marked differences in their feeding habits and the near rigidity of these feeding habits throughout the year may be attributed to the stability of the environment.

77-001244 Yamnaka, H. [TUNAS AND OCEANIC CONDITIONS.] J. Oceanogr. Soc. Jpn., 20th Anniv. Vol. 663-678. 1962. In Japanese with English summ. SFA 22(3)

POPULATION STUDIES, PRODUCTION, ETC.

77-001245 Bagliniere, J.-L. LES POPULATIONS DE SAUMON ATLANTIQUE (/SALMO SALAR/ L., 1766) EN BRETAGNE-BASSE-NORMANDE. I.--CARACTERISTIQUES DES SMOITS DE LA RIVIERE ELLE. [THE POPULATIONS OF /SALMO SALAR/ L., 1766 IN BRITTANY-LOWER NORMANDY I.--CHARACTERISTICS OF THE SMOLTS OF THE ELLE RIVER.] Ann. Hydrobiol. 7 (2): 141-158. 1976. In French with English summ. SFA 22(3)

[I.N.R.A., 65, rue de Saint-Brieuc, 35042 Pennes Cedex, France] 11, 171 Atlantic salmon smolts have been caught in the lower part of the River Elle between the end of March and the beginning of May in 1971 (captured by electricity), 1972 and 1973 (hourly captures by trapping). The total length ranges from 120 to 251 mm and the weight from 14 to 130 g. They are one or two years old. The smolt age at downstream migration shows important variations from year to year: 67 percent of the fishes caught in 1972 were one-year-old but only 38 percent in 1973.--From abstr.

77-001246 Best, E. A. JUVENILE HALIBUT IN THE GULF OF ALASKA: TRAWL SURVEYS, 1970-1972. Int. Pac. Halibut Comm. Tech. Rep. No. 12. 64p. 1974. SFA 22(3)

[Int. Pac. Halibut Comm., Seattle, WA]

77-001247 Best, E. A. JUVENILE HALIBUT IN THE EASTERN BERING SEA: TRAWL SURVEYS, 1970-1972. Int. Pac. Halibut Comm. Tech. Rep. No. 11. 32p. 1974. SFA 22(3)

[Int. Pac. Halibut Comm., Seattle, WA]

77-001248 Castro Barrera, T. ICTIOPLANKTON DE BAHIA MAGDALENA, BAJA CALIFORNIA SUR. [ICHTHYOPLANKTON OF MAGDALENA BAY, BAJA CALIFORNIA SOUTH.] Cienc. Mar. 2 (2): 10-36. Dec. 1975. In Spanish with English Summ. SFA 22(3)

[Africa 20-104, Coyoacan, Mexico 21] This study is based on the Plankton material collected during four research cruises in Magdalena Bay, Baja California South. One hundred eleven samples were analyzed. The collections were primarily obtained using nets with a mesh of 0.505 mm but others were made using a mesh of 0.333 mm. The Plankton tows were made under the water surface. The distribution and abundance of the species in the Bay, specially those of commercial and ecological importance are discussed. 32 families were found with the most abundant being: Engraulidae, Scianidae, Pomadasysidae, Clinidae and Gobiidae. In addition the following families of the flat fish group were noted: Rothidae, Soleidae, Pleuronectidae and Cynoglossidae. The distribution and abundance of eggs and fish larvae of the Engraulidae family was studied during different seasons of the year and an evaluation of this resource at the study site was made.

SPORT FISHERY ABSTRACTS

77-001249 Clady, M. ABUNDANCE AND PRODUCTION OF YOUNG JARGEMOUTH BASS, SMALLMOUTH BASS, AND YELLOW PERCH IN TWO INFERTILE MICHIGAN LAKES. Trans. Am. Fish. Soc. 106 (1): 57-63. Jan. 1977. SFA 22(3)
Okla. Coop. Fish. Res. Unit, Okla. State Univ., Stillwater 740741

77-001250 Clark, S. H.; Brown, R. W. CHANGES IN BIOMASS OF FINFISHES AND SQUIDS FROM THE GULF OF MAINE TO CAPE HATTERAS, 1963-74, AS DETERMINED FROM RESEARCH VESSEL SURVEY DATA. NOAA Fish. Bull. 75 (1): 1-21. Jan. 1977. SFA 22(3)

[NMFS, Northeast Fish. Cent., Woods Hole, MA 02543] Trends in finfish and squid biomass for the 1963-74 period in the International Commission for the Northwest Atlantic Fisheries (ICNAF) Subarea 5 and Statistical Area 6, as evidenced by autumn bottom trawl survey data, were reviewed. Commercial statistics reported to ICNAF reveal that landings for groundfish species of major commercial importance peaked in 1965 and subsequently declined with shifts in directed effort to major pelagic species (for which landings peaked in 1971). Trends in landings for species of lesser commercial importance primarily reflect increasing effort throughout this period.--From abstr.

77-001251 Darracott, A. AVAILABILITY, MORPHOMETRICS, FEEDING AND BREEDING ACTIVITY IN A MULTI-SPECIES, DEMERSAL FISH STOCK OF THE WESTERN INDIAN OCEAN. J. Fish Biol. 10 (1): 1-16. Jan. 1977. SFA 22(3)

[Dep. Plan. Environ., Private Bag X213, Pretoria, Republic of South Africa] A multi-species demersal fish stock was studied from April 1969 to July 1970. The common species are described in this paper and consist of *Carcharhinus sealei*, *Phynchobatus djeddensis*, *Dasyatis kuhlii*, *Pachycentron canadum*, *Psettodes erumei* and *Arius* sp. With the exception of *Pachycentron canadum*, these fish were available throughout the year and some coincidence of increased availability was noted in August/September. *Psettodes erumei*, the commonest fish caught, was most available in August/September, February/March and June. The size and weight distribution of each of these fish is described. Morphometric results indicate that two fish, *Dasyatis kuhlii* and *Psettodes erumei*, exhibit sexual dimorphism, the females being larger and heavier than the males. *Carcharhinus sealei*, *Phynchobatus djeddensis* and *Pachycentron canadum* have a nearly isometric growth exponent whereas *Dasyatis kuhlii*, *Psettodes erumei* and *Arius* sp. have an allometric growth exponent. All fish were carnivores, *Phynchobatus djeddensis*, *Pachycentron canadum* and *Arius* sp. being primarily crustacean feeders, *Dasyatis kuhlii* feeding on polychaetes and crustaceans and *Carcharhinus sealei* and *Psettodes erumei* feeding mainly on fish. The increased number of all three bony fish noted in August/September (immediately prior to the short rains in October/November) is discussed in relation to feeding activity and the initiation of spawning activity. It is suggested that spawning in *Psettodes erumei* and *Arius* sp. is initiated in September, continuing possibly to February and then during the long rains (March/May) and the South East Monsoon the fish recover. It is also suggested that pregnant elasmobranchs may come inshore in greater numbers during the rains to give birth.

SPORT FISHERY ABSTRACTS

77-001252 Dumas, J. DYNAMIQUE ET SEDENTARITE D'UNE POPULATION NATURALISEE DE TRUITE ARC-EN-CIEL (/SALMO GAIRDNERI/ RICHARDSON) DANS UN RUISSEAU DE MONTAGNE, L'ESTIBERE (HAUTES-PYRENEES). (DYNAMICS AND SEDENTARINESS OF A NATURALIZED POPULATION OF RAINBOW TROUT (/SALMO GAIRDNERI RICHARDSON) IN A MOUNTAIN STREAM: THE ESTIBERE (HAUTES-PYRENEES). 1 Ann. Hydrobiol. 7 (2): 115-139. 1976. In French with English summ. SFA 22(3)

[I.N.R.A., Lab. Ecol. Poissons, R.P. 79, 64200 Biarritz, France] Two inventories were carried out in August 1968 and September 1969 in a winding part of a remote mountain stream, containing a naturalized population of rainbow trout. Living conditions of trout are difficult: water is not much mineralized and is very cold from November to May. The population is weightly rather than small (46.3 and 57.3 kg/ha), numerically dense (3,905 and 4,619 trout/ha) and young (41 and 60 percent of fry). This large recruitment is mainly due to the high reproduction potential (3.2 eggs/m²) and to the absence of competitors in fry areas. The annual rate of survival reaches 31 percent after 1 year of age. Growth is small (16.5 cm at 3 yrs age), though the summer growth speed is very fast (1 cm/month): the feeding beneficial period is limited to 5 months. The annual net production of trout in this area amounts to 61 kg/ha/year. The reproduction takes place from the end May to the beginning of June, when the thaw is settling in shallow riffles. Fry inhabit these same areas and as soon as the beginning of their second year, young trout establish their home range in the deeper and lower riffles areas where 96 percent of trout 1+ old and over are found. These trout show a sedentary trend, very strong after the first year and comparable to that observed in brown trout. Nearly all the individuals have not got down more than 200 m after 1 yr and 71 percent are found /in situ/. An attempt at the description of ecological preferences of the Estibere strain, compared to other observations concerning this species in America and Europe, allows to determine the stream areas in which this kind of trout is likely to be successfully introduced: grayling areas thinly inhabited by brown trout and containing a sufficient number of shelters and covers in pools.--From abstr.

77-001253 Gunderson, D. R. POPULATION BIOLOGY OF PACIFIC OCEAN PERCH, /SEBASTES ALUTUS/, STOCKS IN THE WASHINGTON-QUEEN CHARLOTTE SOUND REGION, AND THEIR RESPONSE TO FISHING. NOAA Fish. Bull. 75 (2): 369-403. Apr. 1977. SFA 22(3)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112] Production and catch per unit effort of Pacific ocean perch, /Sebastes alutus/, stocks in the Washington-Queen Charlotte Sound region have declined drastically in recent years, largely as a result of Soviet and Japanese exploitation during 1966-69. In the region off Washington and southern Vancouver Island, production declined from 39,000 metric tons in 1967 to 6,000 metric tons in 1969, and catch per hour declined 45 percent during the same period. Pacific ocean perch are ovoviparous, and so their populations lack the resilience of highly fecund, oviparous groups such as the gadoids. Their ability to maintain even current levels of abundance is uncertain. Age composition, growth rates, and mortality rates were estimated for two separate stocks occupying this region: one in Queen Charlotte Sound, B.C., and one occupying the area off northern Washington and southern Vancouver Island. Instantaneous rate of natural mortality was estimated to lie between 0.1 and 0.2. Recruitment to the fishing grounds is not complete until age 16 and the proportion of each age group vulnerable to fishing was estimated by stock for age groups 10 (0.31-0.35: through 15 (0.87-0.94). Age at sexual maturity differed between stocks, ranging from 9 to 11 yr for females and 6 to 7 yr for males. Compensatory mechanisms that would tend to restore population fecundity and recruitment to preexploitation levels were discussed,

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and the limits of some of these mechanisms were explored with a computer program. The results of this analysis suggested that past levels of exploitation went far beyond those levels that could be sustained by Pacific ocean perch stocks on a long-term basis. It was concluded that future rates of exploitation should be regulated so that the annual catch never exceeds 10 percent of the mean stock biomass on hand during the year.--From abstr.

77-001254 Gunderson, D. R.; Westrheim, S. J.; Demory, P. I.; Fraidenburg, M. E. THE STATUS OF PACIFIC OCEAN PERCH (*SEBASTES ALUTUS*) STOCKS OFF BRITISH COLUMBIA, WASHINGTON, AND OREGON IN 1974. Environ. Can. Fish. Mar. Serv. Tech. Rep. No. 690. iv + 63p. 1977. SFA 22(3)

A joint, Canada-United States stock assessment of Pacific ocean perch (*Sebastes alutus*) off British Columbia, Washington, and Oregon was completed for the period 1956-74. Data analyzed included catch statistics from all participating nations, size and age composition of commercial landings in Canada and the United States, and biomass estimates based on research vessel catches. In the Hecate Strait-Queen Charlotte Sound region (B.C.), three stocks were identified, one of which was relatively large and unutilized, one small and moderately utilized, and one now small and overutilized. In the Vancouver-Oregon region all stocks are now small and overutilized.

77-001255 Hara, I. POPULATION STUDIES ON ROUND HERRING--I. ON ROUND HERRING FISHED OFF THE WESTERN COAST OF SAN'IN DISTRICT. Publ. Jpn. Soc. Sci. Fish. 43 (3): 265-270. Mar. 1977. SFA 22(3)

[Tokai Reg. Fish. Res. Lab., Kachidoki, Chuo-ku, Tokyo, Japan] One of the good fishing grounds for the round herring is off the western coast of the San'in district. Other main fishing grounds along the coast of San'in district lie around Oki islands and off the coast of Kyushu. A comparison of the relative abundances at two stages, the juvenile and the spawner, was made in order to understand the population dynamics of the round herring that dwells off the western coast of Shimane Pref. The results indicate that the relationship between the Parent and the Progeny well fits to a density dependent reproduction curve. It was, also, found that this species spawns from May to June off Hamada and consists of several subpopulations that are found off the coast of San'in district. The increase in mean fork length over the fishing season, based on measurements, give a growth curve of the round herring. Round herrings off the western coast of San'in district grow up 17 cm in mean fork length at the end of the year of birth.

77-001256 Henderson, E. B.; Whiteside, B. G. POPULATION DYNAMICS OF THE GREEN SUNFISH MALE X REDEAR SUNFISH FEMALE HYBRID AS COMPARED WITH ITS RECIPROCAL-CROSS AND PARENTAL SPECIES. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 273-278. 1975/1976. SFA 22(3)

[Texas Parks Wildl. Dep., Bastrop 78602] A study was made on the growth and survival rates, sex ratios, and vulnerability to angling of the green sunfish male x redear sunfish female (G x R) hybrid as compared with its reciprocal cross and parental species. The G x R hybrid had the highest mean annual absolute growth rate while the redear sunfish male x green sunfish female (R x G) hybrid had the highest mean annual relative growth rate. The G x R hybrid generally had the highest mean annual survival rate, while the green sunfish had the lowest. The sex ratios were: G x R hybrids, 99 percent males; R x G hybrids, 88 percent males; green sunfish, 83 percent males; and redear sunfish, 45 percent males. The G x P hybrid, R x G hybrid, and green sunfish were more vulnerable to angling than the redear sunfish.

SPORT FISHERY ABSTRACTS

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Abundant F(2) offspring were observed in the pond containing pairs of R x G hybrids, while no F(2) offspring were observed in the pond containing pairs of G x R hybrids.

77-001257 Hickman, G. D.; Hevel, K. W. COMPARISON OF POPULATION ESTIMATES OF LARGEMOUTH BASS IN FORREST LAKE, MISSOURI, UTILIZING A BASS TOURNAMENT AND AN ELECTROSHOCKER FOR COLLECTION OF RECAPTURES. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 102-105. 1975[1976]. SFA 22(3)

[TVA, Div. Forest. Fish. Wildl. Develop., Norris, TN 37828] This study was designed to obtain population estimates of largemouth bass in 703-acre Forrest Lake, Missouri, and also to compare population estimates obtained using electrofishing and tournament angling as recapture methods. A total of 283 electroshocked bass was marked with floy tags during September 30-October 4, 1974. Recaptures obtained during a two-day (October 12-13, 1974) bass fishing tournament yielded a population estimate of 1,203 bass over 250mm (10 in) in total length. During October 15-17, 1974, bass were resampled by electrofishing resulting in a population estimate of 1,032 bass over 250mm in length.

77-001258 Houde, E. D. ABUNDANCE AND POTENTIAL YIELD OF THE ROUND HERRING, *ETRUMUS TERES*, AND ASPECTS OF ITS EARLY LIFE HISTORY IN THE EASTERN GULF OF MEXICO. NOAA Fish. Bull. 75 (1): 61-89. Jan. 1977. SFA 22(3)

[Rosenstiel Sch. Mar. Atmos. Sci., Univ. Miami, 4600 Rickenbacker Causeway, Miami, FL 33149] Eggs and larvae of the round herring, *Etrumus teres*, were surveyed from plankton collections made in the eastern Gulf of Mexico from 1971 to 1974. Spawning occurred from mid-October through May where depths ranged from 30 to 200 m, surface temperatures from 18.4° to 26.9°C, and surface salinities from 34.5 to 36.5‰. A major spawning area was present 150 km from Tampa Bay. Mean relative fecundity of 8 adult females was 296.5 ova per gram and the sex ratio of 71 adults was 1:1. The development time of eggs from spawning to hatching was approximately 2.0 days at 22°C. Three methods were used to determine adult biomass. The most probable annual estimates of biomass were approximately 700,000 metric tons in 1971-72 and 130,000 metric tons in 1972-73. The best estimates of the range of potential annual yields to a fishery were from 50,000 to 250,000 tons. Abundance and mortality rates of larvae were estimated in each year. It is probable that more than 99.4 percent mortality occurred between spawning and the 15.5-mm larval stage during 31 days in 1971-72 and more than 98.3 percent mortality occurred for the same period in 1972-73.--From abstr.

77-001259 Le Cren, E. D.; Kipling, C.; McCormack, J. C. A STUDY OF THE NUMBERS, BIOMASS AND YEAR-CLASS STRENGTHS OF PERCH (*PERCA FLUVIATILIS* L.) IN WINDERMERE FROM 1941 TO 1966. J. Anim. Ecol. 46 (1): 281-307. Feb. 1977. SFA 22(3)

[Freshwater Biol. Assoc., Ambleside, Cumbria, England] The population dynamics of perch (*Perca fluviatilis* L.) in Windermere from 1941 to 1966 have been studied. A trap fishery reduced numbers from 6 million adult fish to 2 million in 1946. Since 1943 the population has been monitored each year. In the south basin the 1955 year-class was very successful and numbers increased and remained high until 1962 when they declined again. In the north basin the initial reduction was more drastic, and numbers remained low until the very successful 1959 year-class. A gill-net fishery has removed about 1 Mg of large pike (*Esox lucius* L.) every year since 1944; small pike (the main predators on perch) became more numerous, and predation on perch

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increased, especially in the north basin. The most successful perch year-class was at least 400 times as abundant as the weakest. High temperatures from June to September in the year of hatch, and low biomass of perch already present were associated with good survival. Factors contributing to poor survival probably include low temperatures, high biomass of perch already present and severe pike predation. More rarely, a low proportion of spawning males, ice cover the previous winter and (since 1960) predation by mergansers (*Mergus serrator*/ L.) may have caused year-class failure. The major changes in the perch population of Windermere from 1941 to 1966 are attributed very largely to the direct and indirect effects of the trap fishery for perch and gill-net fishery for pike operated by the Freshwater Biological Association.

77-001260 Lear, W. H.; Day, F. A. AN ANALYSIS OF BIOLOGICAL AND ENVIRONMENTAL DATA COLLECTED AT NORTH HARBOUR RIVER, NEWFOUNDLAND, DURING 1959-75. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 697. xv + 61p. 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Newfoundland Biol. Stn., St. John's, NF, Canada] Biological and environmental data collected from North Harbour River during 1959-75 are presented and analyzed. The Atlantic salmon smolt run decreased during the early to mid 1960's and has now stabilized. The average smolt age has decreased by about 0.5 years since 1961. Atlantic salmon reared in North Harbour River are harvested mainly in St. Mary's Bay with about 25 percent being harvested mainly as 1-sea-winter salmon on the east and northeast coasts of Newfoundland. The average growth rate of sea run brook trout, as determined from tagging studies, indicated that, for the period spent at sea, the rate was 1.56 g per day. The upstream runs of brook trout have declined since 1961 but have now stabilized as 1300-1500 fish. The upstream runs of brown trout have increased by 100 percent since 1961. Runs of other anadromous and catadromous species are recorded as well as environmental and physical data collected in conjunction with the pink salmon transplant experiment.

77-001261 Libey, G. S. A MATHEMATICAL MODEL AND COMPUTER SIMULATION OF THE ANADROMOUS ALEWIFE, *Alosa pseudoharengus* (WILSON), MIGRATION IN THE PARKER RIVER, MASSACHUSETTS. Ph.D. dissertation, Univ. Mass. 206 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977.

A linear compartment model of the anadromous alewife, *Alosa pseudoharengus*, migration in the Parker River, Massachusetts, is described. The model is based on the findings of the 1972-1975 biological studies. Analysis of the population structure revealed that the mortality rate for unspawned fish (42 percent) has been constant, while the mortality rate for fish participating in the spawning migration has varied from 60 percent (1972-1973) to 48.5 percent (1974-1975). Recruitment rates varied with sex and age. The interactions among differential mortality rates and variable recruitment rates is proposed as the source of a 4-5 year cyclical perpetuation of a year class character (strong or weak) noted by investigators in other long term alewife studies. The rate of fish movement into fresh water was governed by water temperature and modified by tidal stage and river discharge during periods of high or low flow conditions. A functional relationship between fish movement and environmental variables is described. Simulation of the 1972-1975 migrations showed a close agreement between observed and predicted data. Projection of the population structure indicates an initial decline and subsequent rise in the number of migrating alewife. The factors governing juvenile production must be further investigated before long range model predictions can be considered valid.--From abstr.

77-001262 Mathews, C. P.; Druck Gonzalez, J. POTENCIAL PESQUERO Y ESTUDIOS ECOLOGICOS DE BAHIA MAGDALENA III. LAS EXISTENCIAS DE RAYAS CON ESPECIAL INTERES A LAS YA APROVECHADAS. [FISHERY POTENTIAL AND ECOLOGICAL STUDIES OF MAGDALENA BAY. III. THE EXISTENCE OF RAYS WITH SPECIAL INTEREST IN USABLE ONES.] Cienc. Mar. 2 (1): 67-72. June 1975. In Spanish with English summ. SFA 22(3)

Preliminary results of some stock assessment work which was carried out in the populations of rays in Bahia Magdalena, B. C. Sur are presented, with some special attentions to *Dasyatis dipterurus* (?). Marked seasonal fluctuations in abundance occur which are probably caused by migratory movements. Some data on the population of *Dasyatis dipterurus* (?) are presented.

77-001263 Mathews, C. P.; Guardado France, V. POTENCIAL PESQUERO Y ESTUDIOS ECOLOGICOS DE BAHIA MAGDALENA II. LAS EXISTENCIAS DE GATAS. HETERODONTIDAE. [FISHERY POTENTIAL AND ECOLOGICAL STUDIES OF MAGDALENA BAY. II. THE STOCK OF SHARKS. HETERODONTIDAE.] Cienc. Mar. (1): 60-66. June 1975. In Spanish with English summ. SFA 22(3)

Some results of work carried out on two species of Port Jackson sharks, *Heterodontidae*, in the area of Magdalena Bay, B. C. Sur are presented. Two species are found, *Heterodontus mexicanus* and *H. francisci*. These show different distributions and migratory movements. Some data on the structure of the two populations are also presented.

77-001264 Mathews, C. P.; Espinoza, J. POTENCIAL PESQUERO Y ESTUDIOS ECOLOGICOS DE BAHIA MAGDALENA IV. LA DISTRIBUCION Y ABUNDANCIA DE LAS EXISTENCIAS DE PESCADO DE PESCAMA. [FISHERY POTENTIAL AND ECOLOGICAL STUDIES OF MAGDALENA BAY. IV. THE DISTRIBUTION AND ABUNDANCE OF DEMERSAL SCALE FISH STOCKS.] Cienc. Mar. 2 (1): 93-96. June 1975. In Spanish with English summ. SFA 22(3)

Some results of surveys carried out on the demersal scale fish of Bahia Magdalena are presented. Abundance fluctuates with depth, area sampled, and season. Preliminary calculations of biomass show that some very marked migratory movements occur; in Magdalena Bay, winter biomass exceeds summer biomass by x4.

77-001265 Moore, W. S. STABILITY OF SMALL UNISEXUAL-BISexual POPULATIONS OF *POECILIOPSIS* (PISCES: POECILIIDAE). Ecology 56 (4): 791-808. 1975. SFA 22(3)

[Dep. Biol., Wayne State Univ., Detroit, MI 48202] All-female species of *Poeciliopsis* depend upon males of closely related species for sperm. This relationship creates a competitive situation in which bisexual females compete with unisexual females for sperm from males of the bisexual species. Earlier studies demonstrated a sufficient mechanism inherent in the behavior of males for allowing coexistence in mixed unisexual-bisexual populations. Courtship preference of males for conspecific females is dynamically countered by social interaction among males: subordinate males mate with unisexual females in impetuous courtships. The *Poeciliopsis monacha*-*Poeciliopsis* 2 *monacha-lucida* complex occurs naturally in small isolated populations where stochastic factors are not negligible. This paper evaluates the stability of small populations of this complex by laboratory population experimentation and stochastic computer simulation. Three small mixed populations persisted in the laboratory for 2 yr but extinction of the bisexual species occurred in four of nine simulated replicates of these experiments. Life tables and fitness values

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calculated from estimates of birth and death rates showed the all-female species to be much more fit in the laboratory populations than was the bisexual species. Additional simulations done at relative fitness values more characteristic of natural populations indicated that extinctions in small isolates would be rare in nature. Isolated demes can become confluent during the annual rainy season. It was expected that this confluence, by effectively increasing population size, might enhance stability by reducing the effect of stochastic factors; simulations of two and four demes mixed annually did not support this hypothesis.

77-001266 Mortensen, E. THE POPULATION DYNAMICS OF YOUNG TROUT (/SALMO TRUTTA/ L.) IN A DANISH BROOK. J. Fish Biol. 10 (1): 23-33. Jan. 1977. SFA 22(3)

[Freshwater Biol. Lab., Univ. Copenhagen, Denmark] The population size, dispersal of fry, growth of fry in relation to density, mortality and production of young trout (/Salmo trutta/ L.) were studied in a Danish brook during 1970-1972. In the first few months after emergence downstream emigration of fry took place both in 1971 and 1972, after which the trout became stationary. Growth was inversely density dependent and mortality was density dependent in the months just after emergence. Later mortality was constant and independent of density. Trout production varied between 10 g/m² and 18.6 g/m² in the 2 years.

77-001267 Nekrasova, M. Ya.; Kovtun, I. P. ANNUAL FLUCTUATIONS IN THE ABUNDANCE OF THE ROUND GOBY, /GORIUS MELANOSTOMUS/, IN RELATION TO NATURAL VARIATIONS IN ITS FOOD SUPPLY IN THE AZOV SEA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtirol.) 16 (2): 331-336. 1976. SFA 22(3)
[Azov res. Inst. Sea Fish., USSR]

77-001268 Nelson, W. R.; Ingham, M. C.; Schaaf, W. F. LARVAL TRANSPORT AND YEAR-CLASS STRENGTH OF ATLANTIC MENHADEN, /BREVOORTIA TYRANNUS/. NOAA Fish. Bull. 75 (1): 23-41. Jan. 1977. SFA 22(3)

[NMFS, Atl. Estuarine Fish. Cent., Beaufort, NC 28516] A Ricker spawning-recruit model was developed for Atlantic menhaden, /Brevoortia tyrannus/, from data on the 1955-70 year classes. The number of eggs produced by the spawning stock was calculated as the independent variable to account for changes in fecundity due to changes in population size and age structure. A survival index was developed from deviations around the Ricker curve and was regressed on several environmental parameters to determine their density-independent effects. The recruit-environment model accounted for over 84 percent of the variation in the survival index. Zonal Ekman transport, which acts as a mechanism to transport larval menhaden from offshore spawning areas to inshore nursery grounds, was the most significant parameter tested. Ricker functions for good and poor environmental years were developed, indicating the wide range of recruitment that can be expected at different stock sizes. Comparisons of spawner-recruit relations for Pacific sardine and Atlantic menhaden indicated striking similarities. Surplus yield for the Atlantic menhaden fishery was calculated from observed and predicted survival, and compared with the actual performance of the fishery.

77-001269 Nesterenko, N. V. REGULARITIES IN THE POPULATION DYNAMICS OF WHITEFISH ACCLIMATIZED IN THE URALS. Sov. J. Ecol. (Encl. Transl. Ekologiya) 7 (1): 37-42. Jan.-Feb. 1976. SFA 22(3)

[SIBIRYBNIIProekt, USSR] The results of acclimatization in the Urals of ripus and chudskii sig from the start of the introduction up to 1971 are examined. In lakes of various type there is observed in the acclimatized fish an identical pattern of population dynamics: after a period of almost imperceptible development there is an explosion in numbers followed by the inevitable fall in numbers. The clear dependence of zooplankton biomass in the lakes and of growth rates and fecundity of the acclimatized fish on fish abundance is examined.

77-001270 Sale, P. F.; Dybdahl, R. DETERMINANTS OF COMMUNITY STRUCTURE FOR CORAL REEF FISHES IN AN EXPERIMENTAL HABITAT. Ecology 56 (6): 1343-1355. 1975. SFA 22(3)

[Sch. Biol. Sci., Univ. Sydney, Sydney, N.S.W., Australia 2006] We examined the patterns of distribution of species of resident fishes in an experimental habitat consisting of 10 small live colonies of the coral /Acropora pulchra/ (L-units), and 10 similar sized pieces of eroded coralline rock (D-units). With the exception of those few species which distinguished D- and L-units, we conclude that the distribution of species among units is a result of chance colonization, not of a systematic partitioning of the living space provided. We anticipate this conclusion to have general validity for reef fish communities. Some consequences for our understanding of the small-scale distribution of fishes on coral reefs are discussed.--From abstr.

77-001271 Sale, P. F. MAINTENANCE OF HIGH DIVERSITY IN CORAL REEF FISH COMMUNITIES. Am. Nat. 111 (978): 337-359. Mar.-Apr. 1977. SFA 22(3)

[Sch. Biol. Sci., Univ. Sydney, Sydney, N.S.W. 2006, Australia] Data have been drawn together to demonstrate that reef fishes by and large are food and habitat generalists with a large amount of overlap in requirements among coexisting species. Suitable living space is the resource most likely to be in short supply for them, and their environment, although benign, is one in which the supply of living space is both spatially and temporally unpredictable. The argument is developed that reef fishes are adapted to this unpredictable supply of space in ways which make interspecific competition for space a lottery in which no species can consistently win. Thus, the high diversity of reef fish communities may be maintained because the unpredictable environment prevents development of an equilibrium community.

77-001272 Sjoblom, V.; Parmanne, P. ABUNDANCE OF BALTIC HERRING LARVAE IN THE SEAS AROUND FINLAND IN 1975. Int. Counc. Explor. Sea C.M. 1976/P:12. 12p. 1976. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

77-001273 Sjoblom, V.; Parmanne, R. ABUNDANCE OF BALTIC HERRING LARVAE IN THE SEAS AROUND FINLAND IN 1974. Int. Counc. Explor. Sea C.M. 1975/P:3. 7p. 1975. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 260, SF-00531 Helsinki, Finland]

SPORT FISHERY ABSTRACTS

77-001274 Sjoblom, V.; Parmanne, R. ABUNDANCE OF SPRAT LARVAE IN THE NORTHERN BALTIC IN 1975. Int. Council. Explor. Sea. C.M. 1976/P: 13. 4p. 1976. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

77-001275 Sjoblom, V.; Parmanne, R. ASSESSMENT OF THE STATE OF EXPLOITATION OF BALTIC HERRING IN FINNISH FISHERIES IN 1970-1975. Int. Council. Explor. Sea C.M. 1976/P:11. 17p. 1976. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 193, SF-00131 Helsinki 13, Finland]

77-001276 Small, J. W., Jr. ENERGY DYNAMICS OF BENTHIC FISHES IN A SMALL KENTUCKY STREAM. Ecology 56 (4): 827-840. 1975. SFA 22(3)

[Dep. Biol., Rollins Coll., Winter Park, FL 32789] Energy dynamics of the benthic stream fishes, *Etheostoma flabellare*, *Ftheostoma spectabile*, and *Cottus caroliniae* were studied in an upper and lower section of Steeles Run, a small stream in central Kentucky. Production was estimated from the exponential model of growth and energy consumption with the use of models derived from laboratory studies on caloric intake and growth. For comparative purposes, energy consumption was also estimated with equations based on an approximation of the metabolic rate. Both systems gave good agreement varying 2-7 percent. Annual production estimates of 10.89 and 14.88 kcal/m² were made for two upper and 3.56-2.58 kcal/m² for two lower sections of stream. Annual consumption by these fish was estimated to be 52.22 and 67.59 kcal/m² for the two upper and 21.83 and 17.87 kcal/m² for two lower sections. Measurement of total fish standing crop gave 1.70-15.95 kcal/m² for the upper and 1.15-7.83 kcal/m² for the lower section. The three benthic species make up about 40 percent of this biomass. Food studies indicate benthic fish are the primary users of aquatic invertebrate production, other sampled species using mostly terrestrial production. *Cottus caroliniae* spawns in winter and the other benthic species in spring. Caloric content varies and drops to its lowest point the season before spawning and then rises rapidly to its peak. Period of maximum growth rate differed among the benthic species; this division of resource usage may allow greater production.

77-001277 Stevens, D. E. STRIPED BASS (*MORONE SAXATILIS*) YEAR CLASS STRENGTH IN RELATION TO RIVER FLOW IN THE SACRAMENTO-SAN JOAQUIN ESTUARY, CALIFORNIA. Trans. Am. Fish. Soc. 106 (1): 34-42. Jan. 1977. SFA 22(3)

[Calif. Dep. Fish Game, Stockton 95205]

77-001278 Toivonen, J. THE STOCK OF SALMON IN THE GULF OF FINLAND. Int. Council. Explor. Sea C.M. 1973/M:17. 5p. 1973. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., Pitkansillanranta 1, SF-00530 Helsinki 53, Finland]

77-001279 Turner, J. L. CHANGES IN THE SIZE STRUCTURE OF CICHLID POPULATIONS OF LAKE MALAWI RESULTING FROM BOTTOM TRAWLING. J. Fish. Res. Board Can. 34 (2): 232-238. Feb. 1977. In English with French summ. SFA 22(3)

[Fish. Resour. Environ. Div., Dep. Fish., FAO of the UN, Rome, Italy]

SPORT FISHERY ABSTRACTS

77-001280 Verneaux, J. BIOTYPOLOGIE DE L'ECOSYSTEME "EAU COURANTE". DETERMINATION APPROCHEE DE L'APPARTENANCE TYPOLOGIQUE D'UN PEUPLEMENT ICTHYOLOGIQUE. [BIOTYPOLOGY OF RUNNING WATERS. PRACTICAL METHOD FOR DETERMINING TYPOLOGICAL RATE OF FRESH-WATER FISH COMMUNITIES.] C. R. Hebd. Seances Acad. Sci. Ser. D Nat. Sci. 284 (8): 675-678. 21 Feb. 1977. In French with English summ. SFA 22(3)

A statistical analysis leads us to divide 32 species of running water fish into 9 socio-ecological clusters. This organization is used to determine the typological rate of fresh-water fish communities.

77-001281 Yellayi, R. R.; Kilambi, R. V. POPULATION DYNAMICS OF WHITE BASS IN BEAVER RESERVOIR, ARKANSAS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 172-174. 1975[1976]. SFA 22(3)
[Dep. Zool., Univ. Ark., Fayetteville 72701] Age and growth, mortality and population structure of white bass from Beaver Reservoir were studied. The number of scale radii increased with age of fish and were useful in the identification of annuli. Growth histories for year classes 1958-1970 showed increased growth during the reservoir formation. Analysis of growth data by the von Bertalanffy growth formula indicated that the postimpoundment white bass attained larger asymptotic lengths than the preimpoundment fish. The factors influencing the asymptotic size were discussed. The population structure revealed that the Beaver Reservoir white bass population was of a declining population with a dominance of older age groups. On the basis of this study, it was recommended that catch limit on white bass be removed and effective January 1974, by the action of the Arkansas Game and Fish Commission, there has been no catch limit on white bass in Beaver Reservoir.

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

77-001282 Baylis, J. R. A QUANTITATIVE STUDY OF LONG-TERM COURTSHIP: II. A COMPARATIVE STUDY OF THE DYNAMICS OF COURTSHIP IN TWO NEW WORLD CICHLID FISHES. Behaviour 59 (3-4): 117-161. 1976. In English with German summ. SFA 22(3)
[Dep. Zool., Univ. Wis., Madison 53706]

77-001283 Benoit, D. A.; Carlson, R. W. SPAWNING SUCCESS OF FATHEAD MINNOWS ON SELECTED ARTIFICIAL SUBSTRATES. Prog. Fish-Cult. 39 (2): 67-69. Apr. 1977. SFA 22(3)
[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

77-001284 Burr, B. M.; Morris, M. A. SPAWNING BEHAVIOR OF THE SHORthead PEDHORSE, /MOXOSTOMA MACPOLEPIDOTUM/, IN BIG ROCK CREEK, ILLINOIS. Trans. Am. Fish. Soc. 106 (1): 80-82. Jan. 1977. SFA 22(3)
[Ill. Nat. Hist. Surv., Urbana 61801]



77-001285 Constantz, G. D. BEHAVIORAL ECOLOGY OF MATING IN THE MALE GILA TOPMINNOW, /POECILIOPSIS OCCIDENTALIS/ (CYPRINODONTIFORMES: POECILIIDAE). Ecology 56 (4): 966-973. 1975. SFA 22(3)

[Dep. Zool., Ariz. State Univ., Tempe 85281] Males of the fish family Poeciliidae cease growth upon attainment of sexual maturity. Because position in fish social hierarchies is in large part size-dependent, /Poeciliopsis occidentalis/ males which mature at a small body size may be locked into subordinate status. As an apparent consequence of disparate competitive abilities, males at extremes of body size exhibited contrasting mating strategies. Females were courted by large, territorial males. Tiny males remained at a distance prior to dashing toward females for a copulatory attempt. The accuracy of sneak copulatory attempts by tiny males appeared to be enhanced by a relatively longer intromittent organ. Quantitative data on territory size and rates of social encounters indicated possible costs and benefits of such alternate strategies. Possible ultimate causes of these contrasting behaviors are the cost-benefit balance of a particular strategy and underlying genes. Possible proximate factors include the growing season, sex ratio, and the competitive environment.

77-001286 Dolan, J. A.; Power, G. SEX RATIO OF AMERICAN EELS, /ANGUILLA ROSTRATA/, FROM THE MATAMEK RIVER SYSTEM, QUEBEC, WITH REMARKS ON PROBLEMS IN SEXUAL IDENTIFICATION. J. Fish. Res. Board Can. 34 (2): 294-299. Feb. 1977. In English with French summ. SFA 22(3)

[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada]

77-001287 Fitzgerald, G. J. THE EFFECTS OF DENSITY OF ADULT FISH ON REPRODUCTION AND PARENTAL BEHAVIOR IN CONVICT CICHLID FISH /CICHLASOMA NIGROFASCIATUM/ (GUNTHER). Ph.D. dissertation, Univ. Western Ontario (Canada) 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

Reproductive success was inversely related to density. The greatest loss of young occurred during the free-swimming fry stage. There was evidence of predation by both parental and other adult fish on the fry. The evolutionary significance of this cannibalism is discussed. The relationship between density and reproductive success was only partially explained by behavioral processes. Increasing the density increased the level of territorial aggression. The importance of the increase in aggression and its possible influence on reproductive success is evaluated. The findings of the study are discussed in relation to Wynne-Edwards' thesis that species limit their population size and density by behavioral processes.--From abstr.

77-001288 Gale, W. F.; Gale, C. A. SPAWNING HABITS OF SPOTFIN SHINER (/NOTROPIS SPILOPTERUS/) --A FRACTIONAL, CREVICE SPawner. Trans. Am. Fish. Soc. 106 (2): 170-177. Mar. 1977. SFA 22(3)

[Ichthyological Assoc., Inc., P.D. 1, Berwick, PA 18603]

77-001289 Hogue, J. J.; Wallus, P.; Kay, L. K. NATURAL REPRODUCTION BY STRIPED BASS IN KENTUCKY AND BARKLEY RESERVOIRS, TENNESSEE. J. Tenn. Acad. Sci. 52 (2): 77-79. Apr. 1977. SFA 22(3)

[TVA, Norris, TN 37828] The first records of natural reproduction by striped bass, /Morone saxatilis/ (Walbaum), in Tennessee are noted. Spawning was speculated to have occurred in the tailwaters below Pickwick and Cheatham Dams.

SPORT FISHERY ABSTRACTS

77-001290 Ivankov, V. N. THE FORMATION OF ULTIMATE FECUNDITY IN INTERMITTENTLY SPAWNING FISH WITH REFERENCE TO THE SOUTHERN ONE-FINNED GREENLING, /PLEUROGRAMMUS AZONUS/ AND THE WILD GOLDFISH, /CARASSIUS AURATUS GIBELIO/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 56-62. 1976. SFA 22(3)

[Dep. Ichthyol. Hydrobiol., Far Eastern State Univ., Vladivostok, USSR] It is shown that in intermittently spawning polycyclic species of fish as well as in monocyclic species, there is a decrease in the number of oocytes during the period of protoplasmic and trophoplasmic growth during maturation of the ovaries. The initial potential fecundity is formed in intermittently spawning fish in stage III of maturity of the gonads and the origination of future batches is noted during the transition to stage III-IV of maturity. In some species the decrease in the number of yolk-filled oocytes during the inception of fecundity may be considerable.

77-001291 Kornegay, J. W.; Humphries, F. T. SPAWNING OF THE STRIPED BASS IN THE TAR RIVER, NORTH CAROLINA. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 317-325. 1975[1976]. SFA 22(3)

[Dep. Biol., East Carolina Univ., Greenville, NC 27834] Spawning of striped bass in the Tar River was studied in 1975 and results were compared with a similar study done in 1965. Egg samples indicated a significant increase in spawning activity probably due in part to an increased population established by stocking. More favorable temperatures in 1975 also resulted in an extended period of peak spawning. The location of major spawning grounds based on egg samples was found to cover a 25 mile span of river between River mile 60 and 85.

77-001292 Leary, D. F.; Murphy, G. I.; Miller, M. FECUNDITY AND LENGTH AT FIRST SPAWNING OF THE HAWAIIAN ANCHOVY, OR NEHU (/STOLEPHORUS PURPUREUS/ FAWLER) IN KANEHOE BAY, OAHU. Pac. Sci. 29 (2): 171-180. Apr. 1975. SFA 22(3)

[U.S. Agency Int. Develop/Philippines, APO San Francisco, CA 96528] Fecundity, length at first spawning, and spawning seasonality of /Stolephorus purpureus/ were determined by examining preserved ovarian eggs and fish captured throughout a 4-year period. Fecundity was estimated from the number of eggs in the most advanced ovarian mode after it was determined that all these eggs hydrated and were spawned. Fecundity (Y) was related to fish weight (X) by the hyperbolic function, $Y = X / (0.0049 - 0.0033X)$. According to this relationship, a fish having a weight equal to the mean for the population contains 566 eggs/g of fish weight. Large variations in fecundity from year to year were attributed primarily to environmental factors whose influence on reproduction by /Stolephorus purpureus/ has not been studied. Length frequencies of ovarian eggs were bimodal, but the smaller modes remained stationary regardless of the position of the larger modes. This was interpreted as evidence that individual fish spawned only once per year. From data on egg length versus fish length it was estimated that fish were first capable of spawning when 35 mm (standard length); the smallest fish observed to contain hydrated eggs was 37.8 mm. Captured fish containing hydrated eggs were rare, 1.1 percent of 1,735 adult females examined. Spawning occurred year around but the incidence was higher during the spring and summer than during the remainder of the year.

77-001293 MacGregor, J. S. OVARIAN DEVELOPMENT AND FECUNDITY OF FIVE SPECIES OF CALIFORNIA CURRENT FISHES. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 181-188. May 1976. SFA 22(3)

[NMFS Southwest Fish. Cent., La Jolla, CA 92038] Four different types of ovarian development in five species of fishes are described. The size distribution of the developing eggs suggests that Pacific herring, */Clupea pallasii/*, spawns one batch of eggs during its spawning season; */Vinciguerria lucetia/* and Pacific saury, */Cololabis saira/*, spawn more than once. The data for jack mackerel, */Trachurus symmetricus/*, and Pacific mackerel, */Scomber japonicus/*, proved to be inconclusive. The average number of eggs per gram of fish in a spawning batch was */V. lucetia/*, 456; */S. japonicus/*, 264; */C. pallasii/*, 277; */T. symmetricus/*, 109; */C. saira/*, 22.

77-001294 Makeyeva, A. P. PECULIARITIES OF THE FORMATION OF THE ADHESIVE MEMBRANE OF THE EGGS OF THE FALSE GUDGEON, */PSEUDOGOBIO RIVULARIS/*. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 337-342. 1976. SFA 22(3)

[Dep. Ichthyol., Moscow Univ., USSR]

77-001295 Merriner, J. V.; Laroche, J. L. FECUNDITY OF THE NORTHERN PUFFER, */SPHOEROIDES MACULATUS/*, FROM CHESAPEAKE BAY. Chesapeake Sci. 18 (1): 81-83. Mar. 1977. SFA 22(3)

[Va. Inst. Mar. Sci., Gloucester Point 23062] Fecundity data for 24 northern puffer from the lower Chesapeake Bay indicate production of up to 0.5 million eggs by 300 mm TL fish. The left ovary averaged 1.6X larger than the right. Despite the physical difference in ovary size, eggs from Gilson's solution treated ovaries were of equivalent size in both left and right ovaries. Fecundity versus total body length and body weight are presented.

77-001296 Nelson, J. L. SEXUAL SELECTION AND THE SWORDTAIL FISH, */XIPHOPOHUS HELLERI/*. Ph.D. dissertation, Univ. Calif. (Santa Cruz). 173 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(8), 1977. SFA 22(3)

A simple two-step experiment was designed to evaluate the efficacy of classical natural versus sexual selection or a combination of the two processes in explaining the probable mode of evolution of sexually dimorphic structures associated with animal reproduction. Predictions of the qualities of the characters were based on Darwin's, Wallace's, and Fisher's hypotheses regarding each theory. Darwin's theory of ornamentation was specifically examined using the sword character of the sexually dimorphic male swordtail fish, */Xiphophorus helleri/*. A discussion of the sexual selection theory is presented and reviewed in the light of recent research on animal reproductive activities. There is at present absolutely no evidence that sexual selection has been important in the reproductive success of extinct or living organisms.-From abstr.

77-001297 Parent, S.; Brunel, P. AIRES ET PERIODES DE FRAIE DU CAPELAN (*/MALLOTUS VILLOSUS/*) DANS L'ESTUAIRE ET LE GOLFF DU SAINT-LAURENT. [SPAWNING AREAS AND TIMES OF CAPELIN (*/MALLOTUS VILLOSUS/*) FROM THE GULF OF ST. LAWRENCE AND ESTUARY.] Trav. Pech. Que. No. 45. 46p. 1976. In French with English summ. SFA 22(3)

[Dep. Oceanogr., Dalhousie Univ., Halifax, NS, Canada] Capelin, an arctic-boreal fish, spawns at ebb tide on intertidal beaches, usually in twilight or darkness. The stay of genitors in a spawning area may last longer (one tidal cycle to two weeks or more) than the actual mating period, since movements along shore of male and female schools

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are asynchronous. Spawning occurs: (1) from mid-April to mid-June in St. Lawrence Estuary; (2) from mid-May to late July on the North Shore; (3) from late May to late June around the Gaspé peninsula and in northern New Brunswick; and (4) from early June to mid-July in Newfoundland. Spawning is exceptional in the southwestern Gulf. This seasonal progression of spawning now corresponds to that of surface isotherms of 6°C and 10°C in the Gulf and Lower Estuary, but not in the Middle Estuary (upstream from the Saguenay). Low salinities, high turbidity, and the migrating pattern of genitors also limit their spawning grounds which, except for the St. Omar-Bonaventure area, have undergone since some hundred years but few local and reversible changes, all man-made. Spawning grounds command different spawning periods which are stable since more than a century, probably because they are tied with different production cycles; photoperiodism or other physical factors which are independent of climate could therefore trigger spawning behavior.--From abstr.

77-001298 Pavlov, D. A.; Soin, S. G. THE REPRODUCTIVE ECOLOGY AND DEVELOPMENT OF THE FRESHWATER "KAMCHATKA TROUT", /*SALMO MYKISS*/. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 284-294. 1976. SFA 22(3)

[Dep. Ichthyol., Moscow Univ., USSR] Data on conditions and times of spawning of the freshwater "Kamchatka trout", /*Salmo mykiss*/, are given. The stanzas and stages of its development are described and a comparison is made with the development of the steelhead and rainbow trout /*S. gairdneri*/. Some recommendations are made as regards the collection of eggs and the biotechnics of breeding the Kamchatka trout.

77-001299 Rogers, C. A. EFFECTS OF TEMPERATURE AND SALINITY ON THE SURVIVAL OF WINTER FLOUNDER EMBRYOS. NOAA Fish. Bull. 74 (1): 52-58. Jan. 1976. SFA 22(3)

[NMFS, Narragansett Lab., Narragansett, RI 02882] A series of experiments was performed to determine the optimum temperature and salinity for incubating winter flounder, /*Pseudopleuronectes americanus*/, embryos. Eggs in lots of 50 were subjected to a 0.5 to 45 ‰ salinity range and a 3° to a 14°C temperature range in a total of 67 salinity-temperature combinations. Highest proportion of viable hatches occurred at 3°C over a salinity range of 15 to 35 ‰. At temperatures above 3°C, the optimal range was 15 to 25 ‰. Viable hatch decreased with increasing temperature.

77-001300 Rogers, C. A. EFFECTS OF TEMPERATURE AND SALINITY ON THE SURVIVAL OF WINTER FLOUNDER EMBRYOS. NOAA Fish. Bull. 74 (1): 52-58. Jan. 1976. SFA 22(3)

[NMFS, Narragansett Lab., Narragansett, RI 02882] A series of experiments was performed to determine the optimum temperature and salinity for incubating winter flounder, /*Pseudopleuronectes americanus*/, embryos. Eggs in lots of 50 were subjected to a 0.5 to 45 ‰ salinity range and a 3° to 14°C temperature range in a total of 67 salinity-temperature combinations. Highest proportion of viable hatches occurred at 3°C over a salinity range of 15 to 35 ‰. At temperatures above 3°C, the optimal range was 15 to 25 ‰. Viable hatch decreased with increasing temperature.

77-001301 Ross, M. R. FUNCTION OF CREEK CHUB (/SEMOTILUS ATROMACULATUS/) NEST-BUILDING. Ohio J. Sci. 77 (1): 36-37. Jan. 1977. SFA 22(3)

[Dep. Forestry Wildl. Manage., Univ. Mass., Amherst 010021]

77-001302 Ruelle, R. REPRODUCTIVE CYCLE AND FECUNDITY OF WHITE BASS IN LEWIS AND CLARK LAKE. Trans. Am. Fish. Soc. 106 (1): 67-76. Jan. 1977. SFA 22(3)

[U.S. FWS, Southeast Reservoir Invest., Clemson, SC 296311]

77-001303 Siddiqui, A. Q. REPRODUCTIVE BIOLOGY, LENGTH-WEIGHT RELATIONSHIP AND RELATIVE CONDITION OF /TILAPIA LEUCOSTICTA/ (TREWAVAS) IN LAKE NAIVASHA, KENYA. J. Fish Biol. 10 (3): 251-260. Mar. 1977. SFA 22(3)

[Dep. Zool., Kenyatta Univ. Coll., P.O. Box 43844, Nairobi, Kenya] In Lake Naivasha /Tilapia leucosticta/ (Trewavas) spawns throughout the year. Males attain maturity at 180 mm and females at 160 mm total length. Males predominate over females in the catches (sex ratio 1.00:0.51). Fecundity ranged from 320 to 1328 eggs with an average of 751. The length-weight regression coefficient is near to the cube. There is little seasonal fluctuation in relative condition of the fishes.--From abstr.

77-001304 Taylor, M. H.; Di Michele, L.; Leach, G. J. EGG STRANDING IN THE LIFE CYCLE OF THE MUMMICHOG, /FUNDULUS HETEROCLOTUS/. Copeia 1977 (2): 397-399. 25 May 1977. SFA 22(3)

[Dep. Biol. Sci., Univ. Del., Newark 197111]

77-001305 Yefremenko, V. N. VERTICAL DISTRIBUTION OF MYCTOPHID EGGS IN THE SOUTH ATLANTIC. Oceanology 16 (4): 404-405. Feb. 1977. SFA 22(3)

The morphology of myctophid eggs in the cleavage state is described. Data on the vertical distribution of these eggs in the Scotia Sea in summer and fall suggest that lantern fishes spawn at depths below 200 m.

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

77-001306 Bagliniere, J.-L. ETUDE DES POPULATIONS DE SAUMON ATLANTIQUE (/SALMO SALAR/ L., 1766) EN BRETAGNE-BASSE-NORMANDIE. II.--ACTIVITE DE DEVALAISSEMENT DES SMOLTS SUR L'ELLE. [THE POPULATIONS OF /SALMO SALAR/ L., 1766 IN BRITANNY-LOWER NORMANDY II.--THE DOWNSTREAM ACTIVITY OF THE SMOLTS IN THE EYLE RIVER.] Ann. Hydrobiol. 7 (2): 159-177. 1976. In French with English summ. SFA 22(3)

[I.N.R.A., 65, Route de Saint-Brieuc, 35042 Rennes Cedex, France] The second part of the study of the population of Atlantic salmon smolts in a river of Brittany gives details of the numbers of smolts migrating and the timing of the runs, together with information about relevant physical factors. This study was made during the spring; in 1972 from first April to 5th May and in 1973 from 23rd March to 5th May. The young salmon were caught at the lower part of the river with a trap visited at all hours of day and night. The main downstream movement occurs during April. The size and age of the smolts decrease during the downstream migration. There are strong correlations between, first, the downstream nocturnal movement and water level and, secondly, the downstream diurnal movement and water temperature for

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which there is a minimal value. The hourly downstream movement shows two peaks: in the morning between 0800 and 0900 hours and in the evening between 1800 and 1900 hours. The factor responsible appears to be light intensity. There are, however, strong annual variations in the numbers of smolts migrating. These variations and the variations in water level and water temperature from year to year seem to be connected with the latitude of the Bretón peninsula, which affects its climate.--From abstr.

77-001307 Cadwallader, P. L. A LABORATORY STUDY OF INTERACTIVE SEGREGATION BETWEEN TWO NEW ZEALAND STREAM-DWELLING FISH. J. Anim. Ecol. 44 (3): 865-875. Oct. 1975. SPA 22(3)

[Freshwater Fish. Res. Stn., Private Bag 20, Alexandra, Victoria 3714, Australia] In the Glentui River, Canterbury, New Zealand adults of the common river galaxias, *Galaxias vulgaris*/Stokell, occur in turbulent parts of riffles, while adults of the upland bully, *Gobiomorphus breviceps*/ (Stokell), occur throughout the river, both in quiet stretches and in the quieter parts of riffles. When regular samples of *Galaxias vulgaris*/ were taken from the river, it was noticed that *Gobiomorphus breviceps*/ increased in numbers in areas from which *Galaxias vulgaris*/ was removed. This observation provided the stimulus for the present investigation into interactive segregation between adults of the two species in a laboratory stream tank. In single-species experiments, groups of individuals of both species occupied similar positions in the stream tank on two separate occasions. In mixed-species experiments, in which the distributions of individual fish of both species were examined in single-species and mixed-species situations, the distributions of individual *Gobiomorphus breviceps*/ were more affected than those of *Galaxias vulgaris*/. It was concluded that interactive segregation between the two species occurred in the stream tank, and that the less stringent habitat requirements of *Gobiomorphus breviceps*/, together with differences in breeding biology and feeding behavior, enable the two species to coexist in the Glentui River.--Summ.

77-001308 Carlson, H. R.; Barr, L. SEASONAL CHANGES IN SPATIAL DISTRIBUTION AND ACTIVITY OF TWO SPECIES OF PACIFIC ROCKFISHES, *SEBASTES FLAVIDUS*/ AND *S. CILIATUS*/, IN LYNN CANAL, SOUTHEASTERN ALASKA. Mar. Fish. Rev. 39 (3): 23-24. Mar. 1977. SPA 22(3)

[NMFS, P.O. Box 155, Auke Bay, AK 99821] Mixed aggregations of rockfishes near Auke Bay, Alaska, were observed by divers over all months of the year. The patterns of activity and distribution differed greatly between warmer months (May-October), when the fish were actively feeding and distributed above the substrate, and colder months (November-April), when the fish were partially or completely hidden between or beneath the substrate and were relatively sluggish and inactive. Selection probably favors this mode of behavior which renders the fish nearly inaccessible to predators when they would be most vulnerable and when food is scarce.

77-001309 Crossland, J. SNAPPER TAGGING IN NORTH-EAST NEW ZEALAND, 1974: ANALYSIS OF METHODS, RETURN RATES, AND MOVEMENTS. N. Z. J. Mar. Freshwater Res. 10 (4): 675-686. Dec. 1976. SPA 22(3)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] During 1974, 5045 snapper *Chrysophrys auratus*/ (Forster) were tagged at various locations along the north-east coast of the North Island. Most were trawl-caught using a canvas cod-end in shallow inshore areas. Four types of tags were used, of which two were found to be effective: a large single-barbed dart tag, and a lock-on spaghetti tag. For the period up to the end of October 1975, 88 (1.74

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percent) were returned. Highest returns were from the Hauraki Gulf (2.3 percent) and lowest from Northland (nil). Analysis of the recapture data showed that most movements were local, with a mean distance between tagging site and recapture position of 13.9 nautical miles (25.7 km). Four movements greater than 50 miles (92.6 km) were recorded. Local movements in the Hauraki Gulf were associated with the spring/summer spawning period. This movement, out from inshore areas which are closed to seiners and trawlers, and schooling behaviour, are thought to be the main factors contributing to the peak in snapper catches at this time of the year.

77-001310 Holt, C. S.; Grant, G. D. S.; Oberstar, G. P.; Oakes, C. C.; Bradt, D. W. MOVEMENT OF WAIYIFE, /STIZOSTEDION VITREUM/, IN LAKE BEMIDJI, MINNESOTA AS DETERMINED BY RADIO-BIOTELEMETRY. Trans. Am. Fish. Soc. 106 (2): 163-169. Mar. 1977. SFA 22(3)
[Bemidji State Univ., Bemidji, MN]

77-001311 Hudson, R. G.; Hester, F. E. MOVEMENTS OF THE REDBREAST SUNFISH IN LITTLE RIVER, NEAR PAIDIGH, NORTH CAROLINA. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 325-329. 1975[1976]. SFA 22(3)

[Dep. Biol., Presbyterian Coll., Clinton, SC 29325] Recoveries of 189 redbreast sunfish (/Lepomis auritus/) tagged in the Little River, North Carolina, indicated that this species is moderately mobile. Upstream movements predominated among fish recaptured within 60 days after their release in April and May. The extent of movement of males and females was about equal. On the basis of measurements at release and recapture, average annual increase in size was 2.4cm in total length and 48.0g in weight. The estimated annual harvest by sport fishermen was 14.7 percent.

77-001312 Kuronuma, K.; Yamashita, M. MILKFISH FRY IN EASTERN COAST OF VIETNAM. J. Oceanogr. Soc. Jpn., 20th Anniv. Vol. 679-686. 1962. SFA 22(3)

77-001313 Lantz, K. F.; Carver, D. C. DISPERSAL OF TOURNAMENT CAUGHT BASS FROM A CENTRAL RELEASE POINT. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 115-118. 1975[1976]. SFA 22(3)

[La. Wildl. Fish. Comm., P.O. Box 44095 Capitol Stn., Baton Rouge 70804] Largemouth bass caught by fishermen during the March, 1975 B.A.S.S. fishing tournament on Toledo Bend Reservoir were tagged and released from a central site to measure dispersal and recapture rate. Dispersal of bass during the four months following the tournament ranged between 0 and 5 miles. The majority of the recaptured fish (93.6 percent) were caught within 2 miles of the release site. A total of 16.7 percent of the released fish was caught by fishermen during the study period. Suggestions are given concerning utilization of tournament caught bass in fish tagging programs in large impoundments.

77-001314 Laurs, R. M.; Yuen, H. S. H.; Johnson, J. H. SMALL-SCALE MOVEMENTS OF ALBACORE, /THUNNUS ALALUNGA/, IN RELATION TO OCEAN FEATURES AS INDICATED BY ULTRASONIC TRACKING AND OCEANOGRAPHIC SAMPLING. NOAA Fish. Bull. 75 (2): 347-355. Apr. 1977. SFA 22(3)

[NMFS, P.O. Box 271, La Jolla, CA 92038] Studies with ultrasonic tracking techniques and oceanographic sampling demonstrated that oceanographic conditions play an important role in the local concentrations and movements of albacore, /Thunnus alalunga/, in U.S. coastal waters. Albacore show a tendency to congregate in the vicinity

77-001314 CONTINUED

of coastal upwelling fronts, presumably to feed. They move away from the immediate area when upwelling ceases and the upwelling front is no longer present at the surface. The movements of albacore also appear to be related to the distribution of sea surface temperature, with fish spending little time in water with surface temperatures cooler than 15.0°C. The average swimming speed for three fish tracked between 27.8 and 50 h was 1.6 knots (82.4 cm/s) with each fish exhibiting slightly faster swimming speeds during hours of daylight than during hours of darkness.

77-001315 McCleave, J. D.; Fried, S. M.; Towt, A. K. DAILY MOVEMENTS OF SHORTRNOSE STURGEON, /ACIPENSER BREVIROSTRUM/, IN A MAINE ESTUARY. Copeia 1977 (1): 149-157. 16 Mar. 1977. SFA 22(3)

[Dep. Zool., Univ. Me., Orono 044731] Daily summer movements of the endangered shortnose sturgeon, /Acipenser brevirostrum/, in Mouswage Bay, a complex Maine estuary, were studied by ultrasonic telemetry. Fourteen sturgeon were tracked up to 25.75 hr and up to 29.38 km. Some wandered extensively while six others exhibited strongly oriented movements in the large, shallow bay. Five of the latter entered other parts of the complex estuarine system. Four moved in the vicinity of the intake or outfall of an inoperative nuclear power plant. Sturgeon often moved in water less than 1-2 m deep, were not oriented by channels dissecting the bay, and at times crossed channels without following the bottom. Mean swimming speeds ranged from 8.1-34.0 cm sec⁻¹ and from 0.07-0.37 body lengths sec⁻¹. There were no diel differences in swimming distances, speeds, or straightness. Swimming movements showed that sturgeon were well oriented to tidal current directions moving with or against the tide. Sturgeon moved freely through waters of widely differing salinities, sometimes encountering changes of 10 percent in less than 2 hr.

77-001316 McCleave, J. D.; LaBar, G. W.; Kirchels, P. W. WITHIN-SEASON HOMING MOVEMENTS OF DISPLACED MATURE SNAPEE TROUT (SALVELINUS ALPINUS/) IN FLOODS POND, MAINE. Trans. Am. Fish. Soc. 106 (2): 156-162. Mar. 1977. SFA 22(3)

[Dep. Zool., Univ. Me., Orono 044731]

77-001317 Parsons, J.; Vickers, K. U.; Warden, Y. RELATIONSHIP BETWEEN ELVER RECRUITMENT AND CHANGES IN THE SEX RATIO OF SILVER EELS /ANGUILLA ANGUILLA/ 1. MIGRATING FROM LOUGH NEAGH, NORTHERN IRELAND. 1. Fish Biol. 10 (3): 211-229. Mar. 1977. SFA 22(3)

[Fish. Res. Lab., The Cutts, Coleraine, Northern Ireland] Between 1932-1947 and from 1960 onwards, elvers have been trapped near the mouth of the River Bann, Northern Ireland, and released into Lough Neagh. Each period of elver transport has been followed by a marked increase in the proportion of male silver eels migrating from the lough. Catches of silver eels were sampled on several nights each year from 1965-1974, and the lengths of a total of 20358 eels measured showed a progressive increase in the percentage of male eels from 9.3-86.0 percent during this period. Various reasons for this change were examined. The different ages at which male and female eels migrate to the sea was not important. There was no evidence to support the hypothesis that male elvers normally remain in estuarine conditions, and their transport to the lough was therefore unnatural. An increasing fishing effort for yellow eels, such as occurred following the introduction of trawling in 1960, would favour males since small eels were returned to the lough. It was not thought, however, that this was a major cause of the changes in sex ratio. Instead, elver transport appeared to be directly implicated, possibly by the overstocking of Lough Neagh, and the phenotypic determination of

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progressively more male eels, but the evidence for this suggestion was inconclusive.

77-001318 Sakamoto, T. ON THE ACTION MECHANISM OF THE OSMOTIC BALANCE REGULATED BY THE T-CL CHARACTER IN WATER MASSES UPON THE MOVEMENTS OF THE PELAGIC FISH SCHOOL. J. Oceanogr. Soc. Jpn., 20th Anniv. Vol. 650-662. 1962. SFA 22(3)

77-001319 Sjoblom, V.; Parmarne, P. THE VERTICAL DISTRIBUTION OF BALTIC HERRING LARVAE IN THE GULF OF FINLAND. Int. Counc. Explor. Sea C.M. 1975/P:2. 12p. 1975. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 260, SF-00531 Helsinki, Finland]

77-001320 Stauffer, J. R., Jr.; Dickson, K. L.; Cairns, J., Jr.; Calhoun, W. F.; Masnik, M. T.; Myers, R. H. SUMMER DISTRIBUTION OF FISH SPECIES IN THE VICINITY OF A THERMAL DISCHARGE NEW RIVER, VIRGINIA. Arch. Hydrobiol. 76 (3): 287-301. Nov. 1975. In English with German summ. SFA 22(3)

[VPI & SU, Blacksburg, VA] Studies were conducted to determine the effect of several variables on the summer distribution of important species in the vicinity of a heated discharge located on the New River in southwestern Virginia. For some species (*Hypentelium nigricans*/, *Ictalurus punctatus*/) there was a marked effect of temperature on the spatial and temporal distributional patterns. For other species multivariate techniques were used to screen for the effects of temperature, photoperiod, time since last chlorination period, river flow, and gradient on abundance. Three major responses to temperature were found: 1) an avoidance to high temperatures (*Hypentelium nigricans*/; *Campostoma anomalum*/; *Notropis rubellus*/; 2) an attraction to high temperatures (*Ictalurus punctatus*/); 3) an indifference to temperature changes within the range observed (*Notropis spilopterus*/).

77-001321 Stevens, J. D. FIRST RESULTS OF SHARK TAGGING IN THE NORTH-EAST ATLANTIC, 1972-1975. J. Mar. Biol. Assoc. U. K. 56 (4): 929-937. Nov. 1976. SFA 22(3)

[8 Courtenay St., Salcombe, Devon, England] Of 2024 blue sharks (*Prionace glauca*/ L.) tagged by charter skippers and anglers, 30 have so far been recovered (1.5 percent). Tagging has been carried out from south-west England, the Channel Islands, the Bay of Biscay and Portugal. Present results indicate a main seasonal migration between about 30°N and 50°N in the north-east Atlantic; however, some sharks appear to travel right around the north Atlantic gyre. Different segments of the population show different patterns of movement.

77-001322 Toivonen, J.; Tuhkunen, A. MIGRATION OF SFA TROUT ALONG THE COASTAL WATERS OF FINLAND ON THE BASIS OF TAGGING EXPERIMENTS. Int. Counc. Explor. Sea C.M. 1975/M:3. 13p. 1975. SFA 22(3)

[Finnish Game Fish. Res. Inst., Fish. Div., P.O. Box 260, SF-00531 Helsinki, Finland]

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77-001323 Winter, J. D. MOVEMENTS AND BEHAVIOR OF LARGEMOUTH BASS (/MICROPTERUS SALMOIDES/) AND STEELHEAD (/SALMO GAIARDNERI/) DETERMINED BY RADIO TELEMETRY. Ph. D. dissertation, Univ. Minn. 200p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(12), 1977. SFA 22(3)

[Four largemouth bass were radio tracked in a north-central Minnesota lake during the summer of 1970. Maximum home range size ranged from .3 to 1.4 ha and primary or utilized ranges were about .04 to .35 ha. Activity radii or locations were distributed from the geometric centers of activity as follows: 54.4 percent were within 25 m, 86.9 percent within 50 m, 92.5 percent within 75 m and 95.0 percent within 100 m. Since most (94.2 percent) bass locations were between shore and 3 m deep, home range shapes tended to be linear. Indices of linearity ranged from 2.04 to 3.33. Bass also made excursions from their primary ranges and returned. From 1971 to 1974, 104 adult steelhead were radio tracked in western Lake Superior and tributaries between 25 April and 31 December. Fall-run steelhead were radio tagged in rivers to determine the amount and distance of upstream migration and the extent of overwintering. Fall-spawning and overwintering were precluded by sporadic rainfall and low water levels. Since a high proportion (8:1) of the steelhead returned to the same rivers in the spring, this suggested that they had selected a specific stream in the fall. In the spring, pre-spawning fish were tracked to study the search for a spawning stream and the environmental conditions which influence runs. Rainy days with high stream levels were associated with significantly larger runs. Twenty steelhead were displaced from French River to the the lagoons of Lester and Knife Rivers to test whether they would reject these streams and home. No steelhead returned to French River but twelve ran up the river where displaced into and seven ran up five other streams. After spawning, steelhead usually dispersed immediately offshore (65.6 percent) but little data were obtained on summer movements.--From abstr.

FOODS AND FEEDING

77-001324 Ager, L. A. MONTHLY FOOD HABITS OF VARIOUS SIZE GROUPS OF BLACK CRAPPIE IN LAKE OKEECHOBEE. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 336-342. 1975(1976). SFA 22(3)

[Fla. Game Fresh Water Fish Comm., Lake Okeechobee Biol. Stn., Okeechobee 33472] Concurrent with other life history investigations of black crappie, /Pomoxis nigromaculatus/ (LeSeuer), in Lake Okeechobee, monthly examinations of stomach contents were made. Three food items--amphipods, opossum shrimp, and fish--comprised the bulk of the Diet. A change in diet occurred in early winter when the occurrence and number of tendipeds dropped to a very low level, and again in late spring to early summer when tendipeds began to comprise a substantial portion of the diet. Data collected indicate tendipeds were primarily ingested as the pupae move toward the water surface and leave their cases rather than being picked from the bottom mud. Small black crappie (from 60 to about 240 millimeters) primarily utilized crustaceans and insects as food items. Increasingly larger fish more frequently utilized fish as food.

77-001325 Arendarenko, G. A.; Zabolotskiy, A. A. FEEDING OF THE RAINBOW TROUT, /SALMO GAIARDNERI/, IN LAKE KHOSHKIN'YARVI (KARELIAN ASSR). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiul.) 16 (1): 153-157. 1976. SFA 22(3)

[SevNIORKh, USSR]

77-001326 Eggers, D. M. FACTORS IN INTERPRETING DATA OBTAINED BY DIET SAMPLING OF FISH STOMACHS. J. Fish. Res. Board Can. 34 (2): 290-294. Feb. 1977. In English with French summ. SFA 22(3)

[Fish. Res. Inst., Univ. Wash., Seattle 98195]

77-001327 Eppley, R. W. A COLLECTION OF RAMBLINGS ON TRADITIONAL AND NEW AVENUES OF PHYTOPLANKTON STUDIES AS THEY RELATE TO MARINE FOOD WEBS. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 127-131. May 1976. SFA 22(3)

[Scripps Inst. Oceanogr., La Jolla, CA 92037]

77-001328 Griffiths, W. E. FOOD AND FEEDING HABITS OF EUROPEAN PERCH IN THE SELWYN RIVER, CANTERBURY, NEW ZEALAND. N. Z. J. Mar. Freshwater Res. 10 (3): 417-428. Sept. 1976. SFA 22(3)

[Fish Wildl. Div., O. S. Longmar Bldg., 6909-116 St., Edmonton, AB T6H 4P9, Canada] The food of 194 perch /Perca fluviatilis/ L. from the Selwyn River (43° 44'S, 172° 26'E) was examined. Numerical, occurrence, and gravimetric methods were used to analyse stomach contents, and seasonal differences in fullness were assessed visually. The diet was stenophagic with the bully /Gobiomorphus cotidianus/ making up almost 95 percent of the diet by weight. Other foods included smelt /Retropinna retropinna/, a mysid /Tenacommisus/, and larvae of the damselfly /Xanthocnemis/. Feeding patterns did not vary significantly with season, but the volume of stomach contents decreased towards autumn. Perch fed predominantly on the most abundant size class of bullies present in the river, and it was concluded that they were opportunistic feeders.

77-001329 Griswold, B. L.; Tubb, R. A. FOOD OF YELLOW PERCH, WHITE BASS, FRESHWATER DRUM, AND CHANNEL CATFISH IN SANDUSKY BAY, LAKE ERIE. Ohio J. Sci. 77 (1): 43-47. Jan. 1977. SFA 22(3)

[Ohio Coop. Fish. Res. Unit, Ohio State Univ., Columbus 43210] Food of yellow perch (/Perca flavescens/), freshwater drum (/Aplodinotus grunniens/), channel catfish (/Ictalurus punctatus/), and white bass (/Morone chrysops/) collected from Sandusky Bay in 1971-72 were recorded and seasonal changes noted. Perch and drum rely on aquatic insect larvae, zooplankton and fish. Catfish were omnivorous feeding on a variety of dipterans, fish and cladocerans. The white bass were generally piscivorous. Each species ate seasonally distinct food based on availability.

77-001330 Gunn, J. M.; Qadri, S. U.; Mortimer, D. C. FILAMENTOUS ALGAE AS A FOOD SOURCE FOR THE BROWN BULLHEAD (/ICTALURUS NEBULOSUS/). J. Fish. Res. Board Can. 34 (3): 396-401. Mar. 1977. In English with French summ. SFA 22(3)

[Dep. Biol., Univ. Ottawa, Ottawa, ON K1N 6N5, Canada]

77-001331 Heidinger, P. C.; Crawford, S. D. EFFECT OF TEMPERATURE AND FEEDING RATE ON THE LIVER-SOMATIC INDEX OF THE LARGEMOUTH BASS, /MICROPTERUS SALMOIDES/. J. Fish. Res. Board Can. 34 (5): 633-638. May 1977. In English with French summ. SFA 22(3)
[Dep. Zool., South. Ill. Univ., Carbondale 62901]

77-001332 Helfrich, L. A., Jr. EFFECTS OF PREDATION BY FATHEAD MINNOWS, /PIMEPHALES PROMELAS/, ON PLANKTONIC COMMUNITIES IN SMALL, EUTROPHIC PONDS. Ph.D. dissertation, Mich. State Univ. 65 p. 1976. From Diss. Abstr. Int. R Sci. Eng. 37(9), 1977. SFA 22(3)

This experiment was designed to examine the effects of predation by fathead minnows, /Pimephales promelas/ Rafinesque, on planktonic communities in a series of eight artificially enriched ponds. Replicate fish populations were established in half of the ponds and the remaining ponds were kept unstocked for reference. Physical, chemical and biological parameters, including phytoplankton and zooplankton densities, were measured at weekly intervals. The fish populations and their food habits are described. Fish predation significantly reduced the densities of both small and large zooplankton species. The gut contents of fatheads suggest a size selection of prey that was related to the size of the minnow. The decrease in the total abundance of herbivorous zooplankters permitted an increase in the total standing crop of algae, primary productivity and turbidity and ultimately effected a shift in algal composition from one dominated by edible green algae, diatoms and cryptomonads to one dominated by inedible blue-green algae. There was a strong inverse relationship between the average density of blue-green algae and the average concentration of free carbon dioxide.

77-001333 Hepworth, D.; Gloss, S. P. FOOD HABITS AND AGE-GROWTH OF WALLEYE IN LAKE POWELL, UTAH-ARIZONA, WITH REFERENCE TO INTRODUCTION OF THREADFIN SHAD. Utah State Div. Wildl. Resour. Publ. no. 76-15. 13p. 1976. SFA 22(3)

[Utah Div. Wildl. Resour., Salt Lake City] Food habits, age and growth of Lake Powell walleye were studied before and after threadfin shad introduction. Walleye were collected from 1966-1971 with standard and vertical gill nets. Before introduction of shad, the diet was predominated by centrarchids. After introduction, walleye fed almost exclusively on shad. Other changes after introduction of shad included a decrease in the frequency of empty stomachs and an increase in mean number of fish per stomach. No change could be shown in volume of food ingested. The number of shad in stomachs varied seasonally. Mean number of shad per stomach was greatest in summer and fall. Walleye were size selective in foraging on centrarchids and shad. Mean length of ingested forage increased with walleye size. Growth was rapid with annular lengths averaging 302, 423, 492, 604, and 778 mm. After the first year, females were generally larger than males. Most rapid growth occurred in the upper reservoir. All walleye sampled were five years or younger. Growth was similar for each year. Changes in diet did not cause any apparent change in growth.

77-001334 Ikusemiju, K.; Olaniyan, C. I. O. THE FOOD AND FEEDING HABITS OF THE CATFISHES, /CHRYSICTHYS WALKERI/ (GUNTHER), /CHRYSICTHYS FILAMENTOSUS/ (BOULENGER) AND /CHRYSICTHYS NIGRODIGITATUS/ (LACEPEDE) IN THE LEKKI LAGOON, NIGERIA. J. Fish Biol. 10 (2): 105-112. Feb. 1977. SFA 22(3)

[Dep. Biol. Sci., Univ. Lagos, Lagos, Nigeria] A total of 1436 specimens were examined in the study of the food habits of the three /Chrysichthys/ species in Lekki Lagoon. Certain differences were found in their food habits. /Chrysichthys walkeri/ fed mostly on insects,

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/Chrysichthys filamentosus/ on crustaceans and /Chrysichthys nigrodigitatus/ on molluscs. It is suggested the observed diversity in feeding habits might be due to an active response to interspecific competition.

77-001335 Jafri, A. K.; Mustafa, S. FOOD SELECTION BY YOUNG /CATLA CATLA/ (HAMILTON-BUCHANAN) IN A TROPICAL FISH POND. J. Fish Biol. 10 (5): 437-440. May 1977. SFA 22(3)

[Dep. Biol., Coll. Sci., Univ. Mosul, Mosul, Iraq] Food selection by young /Catla catla/ from a tropical fish pond was studied by computing the electivity indices for various types of planktonic food organisms. The fish was found to be a selective feeder. A positive selection was observed for cladocerans, Copepods and nauplii larvae. Among the rotifers, however, /Keratella/ and /Brachionus/ were positively selected while /Rotaria/ was completely avoided. High electivity indices for some and low for the other genera were observed within each group of phytoplankton. Strict stenophagism seemed to occur for certain phytoplanktonic organisms.

77-001336 King, P. A.; Wissing, T. E.; DeVillez, E. J.; Chimney, M. J.; Randall, W. B., Jr. NUTRITIONAL IMPLICATIONS OF SURFACE FEEDING BY GIZZARD SHAD (/Dorosoma cepedianum/) ON INSECT REMAINS IN AN OHIO RESERVOIR. J. Fish. Res. Board Can. 34 (2): 269-273. Feb. 1977. In English with French summ. SFA 22(3)

[Dep. Zool., Miami Univ., Oxford, OH 45056]

77-001337 Lande, R. FOOD AND FEEDING HABITS OF THE LONG ROUGH DAB, /HIPPOGLOSSUS PLATSSOIDES/ (FABRICIUS) (PISCES, PLUPONECTIDAE), IN BORGENFJORDEN, NORWAY. Sarsia 62: 19-24. 30 Dec. 1976. SFA 22(3)

[Zool. Inst., Univ. Trondheim, Posenborg, N-7000 Trondheim, Norway] The food and feeding habits of long rough dabs, 23-34 cm long, were investigated from April 1969 to March 1970. Their special food was primarily epifaunal species. Most important were echinoderms, particularly /Ophiura alhida/, and crustaceans (mysidaceans and /Crangon vulgaris/). Small molluscs also occurred in relatively large numbers. In this respect the long rough dabs differ in their feeding habits from the plaice and the dab from the same area, which are mainly mollusc/polychaete feeders. There was much less seasonal variation in the feeding habits of the long rough dab than in the other two species.

77-001338 Marais, J. F. K.; Erasmus, T. CHEMICAL COMPOSITION OF ALIMENTARY CANAL CONTENTS OF MULLET (TELEOSTEI: MUGILIDAE) CAUGHT IN THE SWARTKOPS ESTUARY NEAR PORT ELIZABETH, SOUTH AFRICA. Aquaculture 10 (3): 263-273. Mar. 1977. SFA 22(3)

[Dep. Zool., Univ. Port Elizabeth, P.O. Box 1600, Port Elizabeth, South Africa] Composition of alimentary canal contents (protein, ash, moisture and carbohydrate by difference) of four mullet species from the Swartkops Estuary, were determined monthly over a 13-month period. It was found that /Liza tricuspidens/ consumed the most nutritious (highest protein and carbohydrate and lowest ash) material followed by /Mugil cephalus/, /Liza richardsoni/ and lastly /Liza dumerili/, the most abundant mullet species in the estuary. It was also found that smaller specimens, irrespective of species, consumed the most nutritious food material. An attempt was made to relate chemical composition to the particular food and substrate preference of each species. Correlation coefficients between moisture and protein (positive), moisture and ash (negative) and ash and protein (negative) enabled the calculation of regression equations by which protein and

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ash can be determined from a relatively simple moisture determination.

77-001339 Mathur, D. FOOD HABITS AND COMPETITIVE RELATIONSHIPS IN THE HANDFIN SHINER IN HALAWAKEE CREEK, ALABAMA. Am. Midl. Nat. 97 (1): 89-100. Jan. 1977. SFA 22(3)

[Ichthyological Assoc. Inc., P.O. Box 12, Drumore, PA 17518] The handfin shiner (*Notropis zonistius*) showed highest feeding activity between 0300 and 0600 hr and 1400 and 1700 hr in Halawakee Creek. The bulk of the diet over the 24-hr period was composed of terrestrial insects (allochthonous material). Feeding intensity was lowest in winter and highest in summer. Fish less than 35 mm fork length fed mostly on dipteran larvae in spring through autumn. Ephemeropteran nymphs were important in the diet in summer and winter. Collembola were consumed only in winter. The diet was most diverse in summer and winter and least in spring. Fish larger than 35 mm ate mostly terrestrial insects and were more specialized feeders. Dipteran larvae, ephemeropteran nymphs and odonate nymphs were consumed in moderate quantities in some seasons. The diet was most diverse in winter and least in summer. The diet of the handfin shiner was compared quantitatively with that of the rough shiner (*Notropis baileyi*), a cyprinid recently introduced in Halawakee Creek. Indices of food similarity indicated a significant overlap in their diets in some seasons. Nilsson's hypothesis of interactive segregation and the principle of competition exclusion are discussed.

77-001340 May, B. F.; Thompson, C.; Gloss, S. P. IMPACT OF THREADFIN SHAD (*Dorosoma petenense*) INTRODUCTION ON FOOD HABITS OF FOUR CENTRARCHIDS. Utah State Div. Wildl. Resour. Publ. no. 75-4. 22p. 1975. SFA 22(3)

[Utah Div. Wildl. Resour., Salt Lake City] Food habits of largemouth bass, black crappie, bluegill, and green sunfish were altered substantially subsequent to the introduction of threadfin shad. Seasonal variation in centrarchid diets was reduced as shad became the main food item. Definite differences in dietary composition for bass and crappie size groups were evident prior to shad utilization. Smaller fish generally fed upon zooplankton and insects with larger individuals including fish in their diets. Subsequent to introduction of shad, all size groups relied heavily upon shad as a forage item. The shad introduction into Lake Powell provided an abundant and vulnerable food source for the four major centrarchids.

77-001341 Moore, J. W.; Potter, T. C. ASPECTS OF FEEDING AND LIPID DEPOSITION AND UTILIZATION IN THE LAMPREYS, *LAMPETRA FLUVIATILIS* (L.) AND *LAMPETRA PLANERI* (BLOCH). J. Anim. Ecol. 45 (3): 699-712. Oct. 1976. SFA 22(3)

[Environ. Prot. Serv., P.O. Box 2310, Yellowknife, NT X0P 1H0, Canada] All species of non-filamentous algae found in the water and on the sediment of Highland Water (New Forest) contributed to the diet of larval lampreys (*Lampetra planeri*). The algae formed, however, only 0.01 and 0.3 percent of the total volume of the gut contents in the winter and summer respectively although in a more productive stream their contribution was greater (1.5 percent). Between the onset of metamorphosis in August and the period just prior to spawning in April, the amount of lipid in *L. planeri* fell from 14.6 to 8.9 percent of the wet weight. During metamorphosis in *L. fluviatilis* the lipid content decreased from 14.1 percent in September to 7.9 percent in the following March. The progressive decrease in percentage lipid in metamorphosing *L. planeri* and *L. fluviatilis* was accompanied by an increase in percentage water. In *L. fluviatilis* the absolute lipid levels declined throughout metamorphosis whereas

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the absolute water content rose initially and then showed a marked decline during November. The combined loss of lipid and water at this time resulted in a marked decline in the animal's wet weight. Lipid levels in adult *L. fluviatilis* fell from approximately 18 percent in migrants caught in the estuary during October to 3 percent in spent animals taken from tributary rivers in late March. Over the migratory period the amount of neutral lipid in the lipid fraction decreased from approximately 80 to 14-22 percent. The migrating males contained a larger amount of lipid in their liver than females whereas the reverse situation was found in the gonads.--Summ.

77-001342 Moore, J. W.; Potter, T. C. A LABORATORY STUDY ON THE FEEDING OF LARVAE OF THE BROOK LAMPREY /LAMPETRA PLANERI/ (BLOCH). J. Anim. Ecol. 45 (1): 81-90. Feb. 1976. SFA 22(3)

[Sch. Biol. Sci., Univ. Bath, Claverton Down, Bath BA2 7AY Somerset, England] Experiments have been carried out at 5 and 15°C to ascertain, to what extent algae, detritus and organic substances dissolved in the water can be utilized for growth by larvae of the lamprey *Lampetra planeri* over a sixty-day period. At 15°C larvae increased in wet weight by 3.8, 2.1 and 0.6 percent respectively when fed on algae at a concentration of $1-2 \times 10^6$ cells ml^{-1} , on detritus at $20-30 mg\ ml^{-1}$ and on *Escherichia coli* at a density of 1×10^8 cells ml^{-1} . Weight was lost at bacterial concentrations of 1×10^6 cells ml^{-1} and in the different concentrations of dissolved organic substances. Under no regime was growth observed at 5°C, the weight loss being least, however, in the case of algae and greatest with dissolved organic substances. The greater nutritive value of algae, compared with detritus, is borne out by the Condition Factor of ammocoetes taken from rivers of relatively low and high algal densities. The assimilation efficiency was related to temperature and was highly variable, a feature possibly due to differences in the activity of individuals in the period prior to experimentation.--Summ.

77-001343 Morrow, J. F.; Schalllock, E. W.; Bergtold, G. F. FEEDING BY ALASKA WHITEFISH, /COPEGONUS NELSONI/, DURING THE SPAWNING RUN. NOAA Fish. Bull. 75 (1): 234-235. Jan. 1977. SFA 22(2)

[Div. Life Sci., Univ. Alaska, Fairbanks 99701]

77-001344 Murdoch, W. W.; Avery, S.; Smyth, M. F. B. SWITCHING IN PREDATORY FISH. Ecology 56 (5): 1094-1105. 1975. SFA 22(3)

[Dep. Biol. Sci., Univ. Calif., Santa Barbara 93106] Guppies (*Poecilia reticulatus*) were given two prey: *Drosophila* (on the water surface) and tubificid worms (on the aquarium bottom). The densities of the two prey were varied gradually over 12 days, from 4:1 to 1:4, and we measured the predator's diets, time of each meal, and time spent at the top, middle, and bottom of the aquarium. The guppies switched, attacking disproportionately whichever of the two prey was more abundant. Switching resulted when the fish increased the fraction of time spent at the surface as the fraction of *Drosophila* available increased. They did this in response to changing reward rates. Switching caused density-dependent mortality. Differences between two groups of fish show that switching behavior is more efficient and should be selected for. The result confirms previous generalizations about switching.

77-001345 O'Brien, W. J.; Slade, N. A.; Vinvard, G. I. APPARENT SIZE AS THE DETERMINANT OF PREY SELECTION BY BLUEGILL SUNFISH (*LEPOMIS MACROCHIRUS*). Ecology 57 (6): 1304-1310. 1976. SFA 22(3)
[Dep. Syst. Ecol., Univ. Kans., Lawrence 66045] Although it is known that visual predation by planktivorous fish tends to be size selective, the mechanism by which fish select their prey has not previously been described. Experiments in which bluegill sunfish (*Lepomis macrochirus*) were given a binary choice between prey of different sizes presented at different distances showed the fish selected the prey that appeared largest, either because of its actual size or its proximity to the fish. This paper incorporates this mechanism of prey selection by apparent size into a model of bluegill predation. According to the model, bluegill, in choosing the apparently largest prey under all conditions, alter their diet composition depending upon the abundance of prey. When prey are abundant, bluegill predominantly select prey of the largest size class available because these have the greatest probability of appearing largest; as large prey become scarce and smaller prey have a greater chance of appearing large, the fish tend to eat more prey from smaller size classes. When the model is tested against data from published fish-feeding experiments, the predicted size ratios of prey eaten correlate accurately with the observed ratios and numbers of prey eaten.

77-001346 Orlova, F. I.; Popova, O. A. THE FEEDING OF PREDATORY FISH, THE SHEATFISH, *SILURUS GLANIS*, AND THE PIKE, *ESOX LUCIUS*, IN THE VOLGA DELTA FOLLOWING REGULATION OF THE DISCHARGE OF THE RIVER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 75-87. 1976. SFA 22(3)

[TEMFAh, Acad. Sci., Moscow, USSR] Changes in the ecology of two of the most abundant predatory fish in the Volga delta, the sheatfish, *Silurus glanis*, and the pike, *Esox lucius*, are shown in connection with the change in the hydrologic regime of the delta with the regulation of the discharge of the river. Over a period of twenty-five years spawning and feeding conditions of the predators changed. A redistribution of predators occurred in the zones of the delta, and there was a change in the species composition of their prey, feeding rhythm, size of annual ration, which, in turn, influenced the abundance of predators. In the spring-spawning predator, the pike, these changes caused a decrease in abundance, while in the sheatfish, a summer-spawning species, abundance increased.

77-001347 Oviatt, C. A.; Kremer, D. M. PREDATION ON THE CTENOPHORE, *MNEMIOPSIS LEIDYI*, BY BUTTERFISH, *PEPRILIUS TRIACANTHUS*, IN NARRAGANSETT BAY, RHODE ISLAND. Chesapeake Sci. 18 (2): 236-240. June 1977. SFA 22(3)

[Grad. Sch. Oceanogr., Univ. R.I., Kingston 02881] Consumption rate of *Mnemiopsis leidyi* by butterflyfish, *Peprilius triacanthus*, ranged between 4 ml/gm dry wt/hr to 184 ml/gm dry wt/hr, depending on fish size and feeding history. These rates of consumption supply adequate food to support the metabolism of the fish and probably account for the late summer-early fall decline in population levels of *Mnemiopsis* observed in Narragansett Bay.

77-001348 Patten, P. G. BODY SIZE AND LEARNED AVOIDANCE AS FACTORS AFFECTING PREDATION ON COHO SALMON, /ONCORHYNCHUS KISUTCH/, FRY BY TORPENT SCULPIN, /COTTUS RHOTHFUS/. NOAA Fish. Bull. 75 (2): 457-459. Apr. 1977. SFA 22(3)

[NMFS, 2725 Montlake Blvd. East, Seattle, WA 98112]

77-001349 Reynolds, W. W.; Reynolds, I. J. OBSERVATIONS ON FOOD HABITS OF THE ANGELFISHES /POMACANTHUS ZONIPRCTUS/ AND /POICANTHUS PASSER/ IN THE GULF OF CALIFORNIA. Calif. Fish Game 63 (2): 124-125. Apr. 1977. SFA 22(3)

[Dep. Biol., Pa. State Univ., P.O. Box 1830, Wilkes-Barre 18708]

77-001350 Scalet, C. G. SUMMER FOOD HABITS OF SYMPATRIC STREAM POPULATIONS OF SPOTTED BASS, /MICROPTERUS PUNCTULATUS/, AND LARGEMOUTH BASS, /M. SALMOIDES/, (OSTEICHTHYS: CENTRARCHIDAE). Southwest. Nat. 21 (4): 493-501. 10 Feb. 1977. SFA 22(3)

[Dep. Wildl. Fish. Sci., S. Dak. State Univ., Brookings, SD 57006] The food habits of the spotted bass, /Micropterus punctulatus/, and largemouth bass, /M. salmoides/, found sympatrically in selected south central Oklahoma streams were studied. A total of 260 fishes was collected. The stomachs of 106 spotted bass and 100 largemouth bass contained food. Crayfish was the most important food organism for spotted bass, both in total volume and total frequency. Fishes were the second most important item. Largemouth bass fed primarily on fishes, both in total volume and total frequency. The second most important item was crayfish.

77-001351 Schenck, J. R.; Whiteside, B. G. FOOD HABITS AND FEEDING BEHAVIOR OF THE FOUNTAIN DARTER, /ETHEOSTOMA FONTICOLA/ (OSTEICHTHYS: PERCIDAE). Southwest. Nat. 21 (4): 487-492. 10 Feb. 1977. SFA 22(3)

[Esprey, Huston & Assoc., 3010 S. Lamar, Austin, TX 78704] Food habits and feeding behavior of the endangered fountain darter, /Etheostoma fonticola/ was studied in the San Marcos River, Texas. This species was found to be selective in how and what it eats. The food habits varied with seasons and size of fish and the species fed primarily during daylight.

77-001352 Schwartz, P. J.; Porter, H. J. FISHES, MACROINVERTEBRATES, AND THEIR ECOLOGICAL INTERRELATIONSHIPS WITH A CALICO SCALLOP BED OFF NORTH CAROLINA. NOAA Fish. Bull. 75 (2): 427-446. Apr. 1977. SFA 22(3)

[Inst. Mar. Sci., Univ. N. Car., Morehead City 28557] A 1972 study documented the fishery, fish and macroinvertebrate faunas, possible predators, and the ecological interrelationships of the offshore North Carolina calico scallop, /Argopecten gibbus/, bed(s). Environmental data of water temperature, salinities, chlorophyll a, water current direction, sediment grain size, and organic composition were obtained aboard commercial and chartered research vessels. Water temperatures progressed seasonally from 12° to 26°C while bottom salinities varied between 31 and 37‰ yet were not radically different from the surrounding habitats. Chlorophyll a data suggested a fairly stable but low plankton fauna over the bed(s) except for June and late October. Little or no differences in bottom type within or without the bed(s) were noted on the basis of sediment particle size, grain size, skewness, or sorting coefficients. Scallops grew faster in the experimental bed than in the commercial bed but little could be found to account for their differences in size. Some 111 species of fishes were captured over the bed(s). Of a vast moving fish fauna, 33 species

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dominated the catches. Of 46 species with food in their stomachs, 20.4 percent feed on scallops with only 9 species considered scallop predators. Bothids, soleids, rajids, labrids, dasyatids, and myliobatids were not active scallop predators. *Halichoeres caudalis* appeared in October when the fishery collapsed economically. Of 12 species of echinoderms, the sea stars *Luidia clathrata* and *Astropecten articulatus* were active scallop predators. While less abundant, 21 additional invertebrates were also suspected predators. *Luidia clathrata* and *A. articulatus* abundance on the beds remained high throughout the season; however, abundance off the beds was somewhat lower. No one factor has yet been found that made the North Carolina calico scallop beds unique, why they existed, or were productive in 1972.

77-001353 Sibert, J.; Brown, T. J.; Healey, M. C.; Kask, R. A.; Naiman, R. S. DETRITUS-BASED FOOD WEBS: EXPLOITATION BY JUVENILE CHUM SALMON (*ONCORHYNCHUS KETA*). Science 195 (4290): 649-650. 6 May 1977. SFA 22(3)

[Pac. Biol. Stn., Nanaimo, BC V9P 5K6, Canada] Harpacticoid copepods are the principal food of chum salmon during the first critical weeks of estuarine life. Heterotrophic food sources are preferentially ingested by harpacticoids. A commercially valuable fisheries resource, usually considered to be planktivorous, is related to a detritus-based, benthically derived food web.

77-001354 Werner, F. E. SPECIES PACKING AND NICHE COMPLEMENTARITY IN THREE SUNFISHES. Am. Nat. 111 (979): 553-578. May-June 1977. SFA 22(3)

[W. H. Kellogg Biol. Stn., Mich. State Univ., Hickory Corners 49060]

77-001355 Whitaker, J. O., Jr. SEASONAL CHANGES IN FOOD HABITS OF SOME CYPRINID FISHES FROM THE WHITE RIVER AT PETERSBURG, INDIANA. Am. Midl. Nat. 97 (2): 411-418. Apr. 1977. SFA 22(3)

[Dep. Life Sci., Ind. State Univ., Terre Haute 47809] Stomach contents were examined from nine species of cyprinid fishes from the White River at Petersburg, Indiana. Species feeding on ooze all seasons were the silvery minnow [*Hybognathus nuchalis* (Agassiz)] and the bluntnose minnow [*Pimephales notatus* (Rafinesque)]. In summer, the emerald shiner [*Notropis atherinoides* (Rafinesque)] fed heavily on chironomid and trichopteran pupae; the river shiner [*N. blennius* (Girard)] and the spotfin shiner [*N. spilopterus* (Cope)] on chironomid larvae; the steelcolor shiner [*N. whipplei* (Girard)] on trichopteran larvae; and the bullhead minnow [*Pimephales vigilax* (Baird and Girard)] on ooze and chironomid and trichopteran larvae. In autumn, *N. atherinoides* fed most heavily on chironomid pupae and ants; the other species on ooze. In winter, all these species and also the sand shiner [*Notropis stramineus* (Cope)] fed largely on seeds. Chironomid larvae and trichopteran larvae were the major foods of the suckermouth minnow [*Phenacobius mirabilis* (Girard)].

77-001356 Williamson, J.; Smitherman, R. O. FOOD HABITS OF HYBRID BUFFALOFISH, TILAPIA, ISRAELI CARP AND CHANNEL CATFISH IN POLY CULTURE. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 86-91. 1975[1976]. SFA 22(3)

[Farm Fresh Catfish Farm, P.O. Box 242, Hollandale, MS 38748] Channel catfish were cultured alone, and in combination with /Tilapia aurea/, Israeli carp, and hybrid buffalofish in 0.1-acre earthen ponds. Studies were conducted on the stomach contents of these species in May, July, and October. During the study the stomachs of 243 channel catfish, 17 adult hybrid buffalofish, 85 fingerling hybrid buffalofish, 157 tilapia, and 7 Israeli carp were examined. Supplemental feed comprised 87 percent of the channel catfish diet, 58 percent in the tilapia, 42 percent in the adult hybrid buffalofish, 56 percent in the hybrid buffalofish fingerlings, and 87 percent in the Israeli carp. Net yields of channel catfish were reduced with the polyculture combinations used.

AGE AND GROWTH

77-001357 Allen, R. L. METHOD FOR COMPARING FISH GROWTH CURVES. N. Z. J. Mar. Freshwater Res. 10 (4): 687-692. Dec. 1976. SFA 22(3)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] The method of comparing growth curves that is described in this paper consists of describing growth for the /i/th group by the equation $L(i) \cdot /t/ = a(i) + b(i)r$ to the /t/, which is linear in the two parameters $a(i)$ and $b(i)$, and subsequently using the analysis of variance to compare the curves. The advantages of the linear growth equation over the von Bertalanffy equation, $L(i) \cdot /t/ = a(i) + b(i)r$ to the /t/(i), are easier analysis and a much simpler interpretation of the differences in the parameters in terms of growth rate and maximum size. An example comparing the growth of male and female red gurnard /Chelidonichthys kumu/ from four areas within the Hauraki Gulf is given.

77-001358 Brown, D.; Aasen, K. D.; von Geldern, C. F., Jr. ALABAMA SPOTTED BASS GROW AT RECORD RATE IN LAKE PERDIS, CALIFORNIA. Calif. Fish Game 63 (1): 60-64. Jan. 1977. SFA 22(3)

[5325 Marconi Ave., Apt. no. 72, Carmichael, CA 95608]

77-001359 Brown, D.; Miller, E. F.; von Geldern, C. F., Jr. DETECTION OF DELAYED ANNULUS FORMATION AMONG BLUEGILL, /LEPOMIS MACROCHIRUS/, POPULATIONS AT LAKE NACIMIENTO, CALIFORNIA. Calif. Fish Game 63 (1): 29-42. Jan. 1977. SFA 22(3)

[5325 Marconi Ave., Apt. No. 72, Carmichael, CA 95608] Age and growth studies of centrarchid populations are sometimes based on assumptions concerning the presence or absence of current annuli. This report examines the relationship of size and age of bluegill to time of annulus formation and considers a procedure for helping determine if current annuli are present.

77-001360 Crumpton, J. F.; Smith, S. L. DIFFERENCES IN GROWTH AND CATCHABILITY OF NATURAL BASS POPULATIONS IN FLORIDA. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 330-336. 1975[1976]. SFA 22(3)

[Fla. Game Fresh Water Fish Comm., Eustis] Largemouth bass collected from selected Florida locations and stocked in hatchery ponds were studied for growth and catchability differences. Data indicates that some populations grow faster than others and that females grow faster than males. Experimental fishing data indicates that some populations show trends towards greater catchability, but no one population was shown significantly more catchable.

77-001361 Dauble, D. D.; Gray, R. H. MICROFISCHE READER FOR PROJECTING FISH SCALE IMAGES. Prog. Fish-Cult. 39 (2): 75. Apr. 1977. SFA 22(3)

[Freshwater Sci., Battelle Northwest Lab., Richland, WA 99352]

77-001362 Etchevers, S. L. LA RELACION LONGITUD-PESO EN 7 PECES DE INTERES COMERCIAL EN EL NOROCCIDENTE DE VENEZUELA. [THE LENGTH-WEIGHT RELATION OF 7 FISH OF COMMERCIAL INTEREST IN NORTHEAST VENEZUELA.] Bol. Inst. Oceanogr. Univ. Oriente Cumana 14 (2): 243-246. Dec. 1975. In Spanish with English summ. SFA 22(3)

[Cent. Invest. Cien., Univ. Oriente, Isla de Margarita, Venezuela]

77-001363 Griffith, J. S. GROWTH OF THE CICHLID FISH *TYLOCHROMIS PANGWELENSIS* IN LAKE PANGWENLU, ZAMBIA. Trans. Am. Fish. Soc. 106 (2): 146-150. Mar. 1977. SFA 22(3)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN 37830]

77-001364 Hubert, W. A. AGE AND GROWTH OF THREE BLACK BASS SPECIES IN PICKWICK RESERVOIR. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 126-134. 1975[1976]. SFA 22(3)

[TVA, Div. Forest. Fish. Wildl. Develop., Muscle Shoals, AL 35660] The age and growth of 454 smallmouth bass, 371 largemouth bass, and 119 spotted bass were determined. When compared to other bodies of water smallmouth bass growth was exceptional, while largemouth bass and spotted bass growth was relatively slow. Distinct sexual differences in growth were not shown; however, sexual differences in longevity and survival were noted. Length-weight relations were calculated for each species and sex from 506 smallmouth bass, 414 largemouth bass, and 134 spotted bass specimens. Differences by species and sex were noted in the calculated length-weight relations.

77-001365 Kimura, D. K. STATISTICAL ASSESSMENT OF THE AGE-LENGTH KEY. J. Fish. Res. Board Can. 34 (3): 317-324. Mar. 1977. In English with French summ. SFA 22(3)

[Wash. Dep. Fish., Olympia 98504]

77-001366 Lemke, A. E. OPTIMUM TEMPERATURE FOR GROWTH OF JUVENILE PLUGGILLS. Prog. Fish-Cult. 39 (2): 55-57. Apr. 1977. SFA 22(3)

[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

77-001367 Mailvan, R. A.; Alekperov, A. P. AN EXPERIMENTAL STUDY ON THE GROWTH AND DEVELOPMENT OF STURGEONS (FAMILY ACIPENSERIDAE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 343-347. 1976. SFA 22(3)

[TsNIORKh, Baku, USSR] At a given stage of development the young of the sturgeon grow as well under hatchery conditions as in the sea. Evidence of this is provided not only by the linear measurements and weight of the test fish which do not go beyond the limits of the same indicators in fish living in the sea, but also by the similarity of the histologic patterns of the corads of reared and wild fish of the same age. However, in order to establish once and for all whether it is possible for sturgeons to mature completely under hatchery conditions, it is essential that observations be prolonged until the fish have reached the minimum age of sexual maturity, namely 12-15 years.

77-001368 Manooch, C. S. III; Huntsman, G. B. AGE, GROWTH, AND MORTALITY OF THE RED PORGY, /PAGRUS PAGRUS/. Trans. Am. Fish. Soc. 106 (1): 26-33. Jan. 1977. SFA 22(3)

[NMFS, Atl. Estuarine Fish. Cent., Beaufort, NC 28516]

77-001369 Ottaway, E. M.; Sirkiss, K. "INSTANTANEOUS" GROWTH RATES OF FISH SCALES AND THEIR USE IN STUDIES OF FISH POPULATIONS. J. Zool. (Lond.) 181 (3): 407-419. Mar. 1977. SFA 22(3)

[Dep. Zool., Univ. Reading, Whiteknights, Reading, Berkshire, England] A technique has been devised for measuring the incorporation of ^{14}C -glycine into fish scales. This provides an indication of the rate of growth of the scale at the time of sampling. The growth of fish scales is classically considered to be related to the growth of the whole fish--hence the method devised has been used to investigate aspects of fish growth in a number of environmental situations.

77-001370 Powles, P. M.; Parker, D.; Reid, R. GROWTH, MATURATION, AND APPARENT AND ABSOLUTE FECUNDITY OF CREEK CHUB, /SEMOTILUS ATROMACULATUS/ (MICHXIL), IN THE KAWARTHA LAKES REGION, ONTARIO. Can. J. Zool. 55 (5): 843-846. May 1977. In English with French summ. SFA 22(3)

[Biol. Dep., Trent Univ., Peterborough, ON K6J 7B, Canada] No difference in growth rate occurred between two study streams, but male creek chub grew more rapidly than females, to a maximum reached at 7 years of age. Walfords were as follows: $y = 4.8 \text{ TL} + 0.810x$, females; $y = 3.5 \text{ TL} + 0.792x$, males. the length-weight relationship, $W = -3.600 + 2.925 \log /L/ (\text{TL})$, derived in the fall, was, as expected, somewhat below the spring relationship from an Illinois study. Kawartha creek chub /M/(50) values were $6.0 \text{ TL} + 0.93 \text{ cm}$ (males) and $6.54 + 0.18 \text{ cm}$ (females). Relative or apparent fecundity (fall egg count) was $F/ = 71.9 + 136/W/$ and total or absolute fecundity (just before spawning) was virtually similar to other areas at $F/ = 61.6 + 91.8/W/$.

77-001371 Balston, S. ANOMALOUS GROWTH AND REPRODUCTIVE PATTERNS IN POPULATIONS OF /CHAETODON MILIARIS/ (PISCES, CHAETODONTIDAE) FROM KANEOHE BAY, OAHU, HAWAIIAN ISLANDS. Pac. Sci. 30 (4): 395-403. Oct. 1976. SFA 22(3)

[Coll. Fish., Univ. Wash., Seattle 98105] Specimens of /Chaetodon miliaris/ collected in Kaneohe Bay, Oahu, during a 15-month study appeared to be reproductively inactive and were smaller than were those from other Hawaiian study areas. Additionally, they lacked calanoid copepods in their diet, the main food consumed elsewhere. It is suggested that the absence of this food in their diet resulted in a

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dietary deficiency leading to poor growth and reproductive inactivity.

77-001372 Sekiguchi, H. [ON FAT DEPOSIT OF THE SPAWNERS OF SAND-
FELS IN ISE BAY, CENTRAL JAPAN.] Bull. Jpn. Soc. Sci. Fish. 43 (2):
123-127. Feb. 1977. In Japanese with English summ. SFA 22(3)
[Fac. Fish., Mie Univ., 2-80 Edobashi, Tsu, Mie, Japan]

77-001373 Shefler, D.; Reich, K. GROWTH OF SILVER CARP
(*HYPOPHthalmichthys molitrix*) IN LAKE KINNARET IN 1969-1975.
Ramdigh 29 (1): 3-16. Mar. 1977. SFA 22(3)
[Minist. Agric., Fish. Dep., Hakiriah, Tel-Aviv, Israel]

77-001374 Six, L. D.; Horton, H. F. ANALYSIS OF AGE DETERMINATION
METHODS FOR YELLOWTAIL ROCKFISH, CANARY ROCKFISH, AND BLACK ROCKFISH
OFF OREGON. NOAA Fish. Bull. 75 (2): 405-414. Apr. 1977. SFA 22(3)
[Pac. Mar. Fish. Comm., 1400 SW 5th Ave., Portland, OR 97201] Of 25
anatomical structures examined, those compared for consistency of
readings were the anal fin pterygiophore, opercle, otolith, scale, and
vertebra. Various heating, staining, and microscopy techniques were
applied to otoliths and scales with little success. The effect of
deviation between otolith readings on survival estimates and age-
length relationships is discussed. Consistency of otolith readings was
generally superior to other structures for these three species. For
yellowtail, canary, and black rockfishes, respectively, 71, 76, and 76
percent of two independent otolith readings deviated by no more than
 ± 1 assumed annulus. Consistency of otolith readings for all three
species decreased with age. Even though age estimates were not
completely consistent, Chapman-Robson and catch curve estimates of
survival, as well as age-length relationships, each derived from two
readings of the same set of otoliths, were not significantly different
at the 95 percent level for the three species. Age-length
relationships are given for both male and female yellowtail, canary,
and black rockfishes.--From abstr.

77-001375 Southward, G. M.; Hardman, W. H. OTOLITH LENGTH AND FISH
LENGTH OF PACIFIC HALIBUT. Int. Pac. Halibut Comm. Tech. Rep. No.
10. 10p. 1973. SFA 22(3)

[Int. Pac. Halibut Comm., Seattle, WA] In 1971, the method used to
estimate fish length from otolith length was found to overestimate the
length of large fish and underestimate the length of small fish. A
more exact relation between fish length and otolith length was
obtained with a cubic equation. Statistical testing indicated a common
line could not represent the relation in different geographical areas.
Separate relationships were determined for four areas and confidence
intervals were computed for each line. As the otolith-fish length
relation is dependent on the growth rate and the growth rate has
changed with time, the regressions are not valid for estimating fish
lengths from otoliths collected during the early years of the fishery.

77-001376 Stevens, J. D. VERTEBRAL RINGS AS A MEANS OF AGE
DETERMINATION IN THE BLUE SHARK (*PRIONACE GLAUCO* L.). J. Mar. Biol.
Assoc. U.K. 55 (3): 657-665. Aug. 1975. SFA 22(3)

[8 Courtenay St., Salcombe, Devon, England] A simple silver nitrate
technique was used to stain calcified rings on whole vertebrae from 82
blue sharks caught between June and September in the northeast
Atlantic. The annual nature of the rings is demonstrated by
correlation with length-frequency and tagging data. Resulting lengths
for age are used to construct growth curves employing the von

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Bertalanffy growth formula. These curves indicate that the blue shark grows from some 45 cm at birth to a length of 300 cm in ten years. The weight-length relationship is found to be $W(kg) = 0.392 \times 10^{-6} L$ to the 3.41 for males, and $W(kg) = 0.131 \times 10^{-6} L$ to the 3.2 for females.

77-001377 Taubert, B. D.; Coble, D. W. DAILY RINGS IN OTOLITHS OF THREE SPECIES OF *LEPOMIS* AND *TILAPIA MOSSAMBICA*. J. Fish. Res. Board Can. 34 (3): 332-340. Mar. 1977. In English with French summ. SFA 22(3)

[Mass. Coop. Fish. Res. Unit, Univ. Mass, Amherst 01003]

77-001378 VanDenAvyle, M. J.; Carlander, K. D. SEASONAL VARIATION IN WEIGHT-LENGTH RELATIONSHIPS OF LARGEMOUTH BASS IN A 3-RECTAPE RESERVOIR. Proc. Iowa Acad. Sci. 84 (1): 35-38. Mar. 1977. SFA 22(3)

[Wildl. Fish. Sci. Dep., Texas A&M Univ., College Station 77843] Lengths and weights of age 0, I, and II largemouth bass were collected during two growing seasons to evaluate seasonal trends in weight-length relationships. Average $K(TL)$ declined significantly between August 1971 and April 1972, but significant growth in length occurred during the interval. In 1972, $K(TL)$ increased from April to July and remained high into November. Condition was better in 1972 than in 1971 when the population density was greater. Monthly estimates of the coefficient of condition, $K(TL)$, and weight-length regressions were both required to interpret seasonal changes. Weight-length regressions calculated over longer collection periods in which $K(TL)$ changed significantly generally did not represent the populations. Average $K(TL)$ provided meaningful comparisons of condition only when monthly weight-length regressions indicated isometric growth.

GEOGRAPHICAL DISTRIBUTION, FISH SURVEYS, ETC.

77-001379 Anderson, M. F. RANGE EXTENSION OF TWO MARINE FISHES TO THE MONTEREY BAY AREA. Calif. Fish Game 63 (2): 132-133. Apr. 1977. SFA 22(3)

[Moss Landing Mar. Lab., Moss Landing, CA 95039]

77-001380 Applegate, S. P. A NEW RECORD-SIZE BONITO SHARK, *ISURUS OXYRINCHUS* / *PAFINESQUE*, FROM SOUTHERN CALIFORNIA. Calif. Fish Game 63 (2): 126-129. Apr. 1977. SFA 22(3)

[Inst. Geol., Ciudad Univ., Apartado Postal 70-296, Mexico City 20, Mexico]

77-001381 Bell, M. A. A LATE MIOCENE MARINE THREESPINE STICKLEBACK, *GASTEROSTEUS ACULEATUS ACULFATUS*, AND ITS BIOGEOGRAPHIC AND EVOLUTIONARY SIGNIFICANCE. Copeia 1977 (2): 277-282. 25 May 1977. SFA 22(3)

[Dep. Biol., Univ. Calif., Los Angeles 90024]

77-001382 Belyanina, T. N. LARVAE AND JUVENILES FROM THE FAMILIES MELANOSTOMIATIDAE, STOMIATIDAE, IDIACANTHIDAE, ASTPONESTHIDAE AND CHAULIODONTIDAE FROM THE COLLECTIONS OF THE INDIAN OCEAN BIOLOGICAL CENTER. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 178-182. 1976. SFA 22(3)

[IOAN, Moscow, USSR]

77-001383 Bertelsen, E.; Pietsch, T. W. RESULTS OF THE RESEARCH CRUISES OF FV "WALTHER HERWIG" TO SOUTH AMERICA. XLVII. CEPHALOID ANGLERFISHES OF THE FAMILY ONEIRODIDAE COLLECTED BY THE FV "WALTHER HERWIG". Arch. Fischereiwiss. 27 (3): 171-189. Mar. 1977. In English with German summ. SFA 22(3)

[Zool. Mus., Univ. Copenhagen, Denmark]

77-001384 Bodaly, R. A.; Lindsey, C. C. PLEISTOCENE WATERFISHED EXCHANGES AND THE FISH FAUNA OF THE PEEL RIVER BASIN, YUKON TERRITORY. J. Fish. Res. Board Can. 34 (3): 388-395. Mar. 1977. In English with French summ. SFA 22(3)

[Dep. Zool., Univ. Manitoba, Winnipeg, MB R3T 2N2, Canada]

77-001385 Bounds, S. M.; Beadles, J. K. FISHES OF THE FOURCHE RIVER IN NORTH-CENTRAL ARKANSAS. Proc. Ark. Acad. Sci. 30: 22-26. 1976. SFA 22(3)

[Div. Biol. Sci., Ark. State Univ., State University] A survey of the fishes of Fourche River in north-central Arkansas was made between June 1974 and March 1976. Field collections and literature records revealed that the river system was inhabited by 94 species of fish representing 21 families. The collected fishes represent both the Ozark and the lowland faunal groups. Fourteen species of /Etheostoma/ and four species of /Percina/ were collected. The records of /Etheostoma asprigene/ and /Plassoma zonatum/ represent extensions of the previously known ranges of these species within the state. /Noturus gyrinus/ and /Etheostoma histrio/ were recorded from the Black River system in Arkansas for the first time since 1894. Predominant highland species of minnows included /Campostoma anomalum/, /Dionda nubili/, /Notropis boops/, /Notropis cornutus chrysocephalus/, /Notropis telescopus/, and /Notropis zonatus/. Predominant lowland species of minnows were /Hybognathus nuchalis/, /Notemigonus crysoleucas/, /Notropis texanus/, and /Notropis venustus/.

77-001386 Branson, B. A. ENDANGERED FISH OF KENTUCKY STREAMS. Nat. Hist. 86 (2): 64-69. Feb. 1977. SFA 22(3)

77-001387 Branson, B. A. THREATENED FISHES OF DANIEL BOONE NATIONAL FOREST, KENTUCKY. Trans. Ky. Acad. Sci. 38 (1-2): 69-73. Mar. 1977. SFA 22(3)

[Dep. Biol. Sci., East. Ky. Univ., Richmond 40475] Long-term field collecting, surveys of the literature, and museum holdings indicate that at least 21 fish species within the confines of Daniel Boone National Forest, Kentucky, are threatened by various human undertakings, principally surface mining. Of those, 13 species are judged as rare or endangered. The most critical areas lie in the upper Kentucky River drainage, lesser impacts being felt in the Cumberland and Licking river systems.

SPORT FISHERY ABSTRACTS

77-001388 Brock, R. E. OCCURRENCE AND VARIETY OF FISHES IN MIXOHALINE PONDS OF THE KONA, HAWAII, COAST. Copeia 1977 (1): 134-139. 16 Mar. 1977. SFA 22(3)

[Hawaii Inst. Mar. Biol., P.O. Box 1346, Kaneohe 96744] The fish fauna of the Hawaiian coastal pond ecosystem situated primarily in recent (historical) lava flows is described. Forty-seven ponds of the 198 surveyed contained fishes and are categorized in five classes that are distinguished by differences in human use and degree of isolation from the sea. The majority of the 37 fish species encountered are marine and several have not been reported previously from mixohaline waters. Biologically, the mixohaline pond system is much less diverse than adjacent nearshore marine communities. It is suggested that marine fish species in the pond habitat are generalists in their food habits. Three methods of pond colonization by marine fishes are proposed: fishes may actively swim up pond effluent currents; fishes may be transported to ponds by waves during periods of storms; or juveniles of some edible species may be intentionally introduced by man.--From abstr.

77-001389 Burr, B. M.; Ruth, D. G. NEW LOCALITIES FOR THE RARE MEXICAN CLINGFISH, /GORISOY PLOVIATILIS/, FROM DURANGO AND CHIHUAHUA. Southwest. Nat. 22 (1): 125-128. 1 Mar. 1977. SFA 22(3)

[Ill. Nat. Hist. Surv., Urbana 61801]

77-001390 Cashner, R. C.; Brown, J. D. LONGITUDINAL DISTRIBUTION OF THE FISHES OF THE BUFFALO RIVER IN NORTHWESTERN ARKANSAS. Tulane Stud. Zool. Bot. 19 (3,4): 37-46. Mar. 1977. SFA 22(3)

[Dep. Biol. Sci., Univ. New Orleans, New Orleans, LA 70122] A survey of the fishes of the Buffalo River in northwestern Arkansas was conducted over a seven year period. The Buffalo is a free-flowing tributary to the cold tailwater section of the White River below Bull Shoals Dam, and is wholly contained in the Ozark Upland province. Fifty-nine species were recorded for the river based on 135 collections and literature records. Relatively continuous distribution was shown for 38 species. The general pattern of distribution for the river was one of species addition rather than replacement from headwaters to the mouth.

77-001391 Crane, M. P.; Simco, B. A. FISHES OF THE RIO ARMERIA, COLIMA, MEXICO. J. Tenn. Acad. Sci.

[Memphis State Univ., Memphis, TN] Abstract only.

77-001392 Denoncourt, P. F.; Hocutt, C. E.; Stauffer, J. P., Jr. ADDITIONS TO THE PENNSYLVANIA ICHTHYOFAUNA OF THE SUSQUEHANNA RIVER DRAINAGE. Proc. Acad. Nat. Sci. Phila. 127 (9): 67-69. 28 Oct. 1975. SFA 22(3)

[Dep. Biol. Sci., York Coll. Pa., York 17405]

77-001393 Denoncourt, P. F.; Potter, W. A.; Stauffer, J. P., Jr. RECORDS OF THE GREENSIDE DARTER, /ETHEOSTOMA BLENNIOIDES/ FROM THE SUSQUEHANNA RIVER DRAINAGE IN PENNSYLVANIA. Ohio J. Sci. 77 (1): 38-42. Jan. 1977. SFA 22(3)

[Dep. Biol. Sci., York Coll. Pa., York 17405]

77-001394 Dukravets, G. M.; Biryukov, Yu. A. THE ICHTHYOFAUNA OF THE NURA RIVER BASIN IN CENTRAL KAZAKHSTAN. J. Ichthyol. (Engl. Transl. Voor. Ikhtiol.) 16 (2): 271-276. 1976. SFA 22(3)
[Kazakhstan Fish. Res. Inst., Balkhash, USSR] The present composition of the ichthyofauna in the Nura River basin and certain features of its formation are discussed and a short description is given of non-native species. The first results of the cohabitation in the basin of the two species of perch, resulting in the convergence of some of their morphobiological characters and the formation of hybrids are analyzed.

77-001395 Echelle, A. A.; Echelle, A. F.; Cross, F. B. FIRST RECORDS OF /CYPRINODON RUBROFLUVIATILIS/ (CYPRINODONTIDAE) FROM THE COLORADO AND ARKANSAS RIVER SYSTEMS, TEXAS. Southwest. Nat. 22 (1): 142-143. 1 Mar. 1977. SFA 22(3)
[Biol. Dep., Baylor Univ., Waco, TX 76703]

77-001396 Eldridge, M. B. FACTORS INFLUENCING DISTRIBUTION OF FISH EGGS AND LARVAE OVER EIGHT 24-HR SAMPLINGS IN RICHARDSON BAY, CALIFORNIA. Calif. Fish Game 63 (2): 101-116. Apr. 1977. SFA 22(3)
[NMFS, Tiburon Lab., Tiburon, CA 94920] To determine the factors affecting the day-night distribution of ichthyoplankton, a series of eight 24-hr samplings was conducted in Richardson Bay, California. Slightly modified channel nets were fished in two locations and collections made for each half-tide stage. Of the different larval taxa collected, /Clupea harengus pallasi/, /Engraulis mordax/ and Gobiidae comprised 98 percent of the total catch. The most speciose family was Cottidae. Densities of larvae and eggs were positively correlated with tide stages of the fastest currents and with night conditions. Analysis of the catch results suggests the most determinant factor in the distribution of eggs and larvae is tidal currents. Interesting occurrences of 10 species of offshore spawned larvae is reported, and a possible explanation for their presence within the bay is discussed.

77-001397 Fives, J. M.; O'Brien, P. I. LARVAL AND POST-LARVAL STAGES OF FISHES RECORDED FROM THE PLANKTON OF GALWAY BAY, 1972-73. J. Mar. Biol. Assoc. U. K. 56 (1): 197-211. Feb. 1976. SFA 22(3)
[Dep. Zool., University College, Galway, Ireland] The Galway Bay area was sampled quantitatively for plankton during 1972-3. The larvae and/or post-larvae of 67 species of fish were identified from the plankton. The recorded occurrence per m³ and the percentage occurrence of the individual species is presented and discussed, and reference is made to the concurrent occurrence of various chaetognath species and copepod species. The results of previous investigations of the plankton of the Galway Bay area are mentioned.

77-001398 Freeze, T. M.; Rayburn, K. J. A NOTE ON THE DISTRIBUTION OF /CHROMOMUS ERYTHROGASTER/ (CYPRINIDAE) IN KENTUCKY. Trans. Ky. Acad. Sci. 38 (1-2): 97. Mar. 1977. SFA 22(3)
[Dep. Biol., Murray State Univ., Murray, KY 42071] The distribution of the southern redbelly dace /Chromomus erythrogaster/ in western Kentucky includes the Gulf Coastal Plain, based on collections from the Tennessee River drainage in Calloway County.

- 77-001399 Froiland, O.: Greve, I. /*CALLIONYMUS RETICULATUS*/ (PISCES, *CALLIONYMIDAE*) FROM WESTERN NORWAY. Sarsia 62: 1-3. 30 Dec. 1976. SFA 22(3)
[Zool. Mus., Univ. Bergen, Norway]
- 77-001400 Griffith, J. THE UPPER TRIASSIC FISHS FROM POLZBERG BFI LUNZ, AUSTRIA. Zool. J. Linn. Soc. 60 (1): 1-93. Jan. 1977. SFA 22(3)
[Dep. Zool., Westfield Coll., Univ. London, England]
- 77-001401 Gunn, J. T.; Ingham, M. C. A NOTE ON: "VELOCITY AND TRANSPORT OF THE ANTILLES CURRENT NORTHEAST OF THE BAHAMA ISLANDS." NOAA Fish. Bull. 75 (1): 222-225. Jan. 1977. SFA 22(3)
[NMFS, Atl. Environ. Group, Narragansett, RI 02882]
- 77-001402 Haedrich, R. L.; Rowe, G. T.; Polloni, P. T. ZONATION AND FAUNAL COMPOSITION OF EPIBENTHIC POPULATIONS ON THE CONTINENTAL SLOPE SOUTH OF NEW ENGLAND. J. Mar. Res. 33 (2): 191-212. May 1975. SFA 22(3)
[Woods Hole Oceanogr. Inst., Woods Hole, MA 02543] The epibenthic macrofauna, including demersal fishes, between 140 and 1900 m on the continental slope south of New England was found to be distributed in three zones: shallow (141-285 m), middle (393-1095 m), and deep (1270-1928 m). Faunal boundaries were associated with the transition zones from shelf to upper continental slope and from upper to lower continental slope. The small Alvin Canyon was not faunally distinct. Fishes and echinoderms were the most abundant taxa, the former predominant in shallow and middle depths and the latter predominating deeper. The macrofauna was less diverse than the macrobenthic infauna of the same region, but the biomass of each fraction of the fauna was of the same order of magnitude.
- 77-001403 Jackson, L. P. ASPECTS OF THE INTERTIDAL ECOLOGY OF THE EAST COAST OF SOUTH AFRICA. S. Afr. Assoc. Mar. Biol. Res. Invest. Rep. No. 46. 72p. 1976. SFA 22(3)
- 77-001404 Jubb, B. A. NOTES ON EXOTIC FISHS INTRODUCED INTO SOUTH AFRICAN WATERS. II. LIVE-BEARING TOOTHED CARPS. Piscator No. 98: 132-134. 1976/1977. SFA 22(3)
- 77-001405 Kailola, P. J. THE PAPE MORAY EEL /*GYMNOTHORAX PIKEI*/ BLISS RECORDED FROM PAPUA NEW GUINEA. Pac. Sci. 29 (2): 165-170. Apr. 1975. SFA 22(3)
[Fish. Res. Surv., Port Moresby, Papua New Guinea] The eel /*Gymnothorax pikei*/ Bliss, type locality Mauritius, is recorded from Papua New Guinea. This, the second known specimen, agrees closely with the type in color pattern, dentition, and body proportions. It is described and compared with the species /*Gymnothorax berndti*/ Snyder, /*G. rueppelliae*/ (McClelland), and /*G. rupelli*/ auct. /*G. berndti*/ is recorded here from Reunion and Mauritius.

77-001406 Lane, E. D.; Hill, C. W. (ed.) THE MARINE RESOURCES OF ANAHEIM BAY. Calif. Dep. Fish Game Fish Bull. 165: 195p. 1975. SFA 22(3)

[Environ. Can., Edmonton, AB, Canada] This report describes 4 years of marine research in Anaheim Bay, Orange County. The history and oceanographic studies describe the background for biological work on marsh plants, invertebrates and fishes. This bulletin attempts to describe what species were present during the study period, their relative abundances, and in some cases a more detailed account of their life histories and population dynamics. The studies were centered on that portion of Anaheim Bay that is landward of the Pacific Coast Highway, within the U.S. Naval Weapons Station, Seal Beach; however, annotated checklists are included on invertebrates and fishes of the outer harbor, seaward of the highway. There are 51 species of marsh plants and algae reported. The invertebrates are noted in annotated checklists, with most attention being centered on the polychaetes and parasitic crustaceans. Some detailed data is given on polychaete populations in pristine Anaheim Bay and developed Huntington Harbour. Forty five species of fish are recorded from the inner portion of the bay and 42 species from the outer harbor. Information is given on the abundances, food, and capture of these species. More detailed accounts of the life histories of six of the more common fish species are described. These include the arrow goby, *Clevelandia ios*; shiner surfperch, *Cymatogaster aggregata*; California killifish, *Fundulus parvipinnis*; Pacific starhorn sculpin, *Leptocottus armatus*; California halibut, *Paralichthys californicus*; and diamond tubot, *Hypsopsetta guttulata*. Life histories include discussions on the numbers, age, growth, food and feeding, and behavior in Anaheim Bay. Where applicable comparisons are drawn with populations elsewhere, such comparisons tend to indicate that the Anaheim Bay salt marsh is an area of very high growth rates and productivity.

77-001407 Lenanton, P. C. J. FISHES FROM THE HYPERSALINE WATERS OF THE STROMATOLITE ZONE OF SHARK BAY, WESTERN AUSTRALIA. Copeia 1977 (2): 387-390. 25 May 1977. SFA 22(3)

[West. Aust. Mar. Res. Lab., P.O. Box 20, North Beach, 6020, Western Australia, Australia]

77-001408 Lubbock, R. FISHES OF THE FAMILY PSEUDOCROMIDAE (PEPCIFORMES) IN THE NORTHWEST INDIAN OCEAN AND RED SEA. J. Zool. (Lond.) 176 (1): 115-157. May 1975. SFA 22(3)

[Zool. Dep., Univ. Cambridge, Downing St., Cambridge, England] An account is given of pseudochromid fishes from the northwest Indian Ocean and Red Sea. Thirteen species are recorded; four new species of *Pseudochromis* and two new species of *Chlidichthys* (all from the Red Sea) are described. Keys are provided, and details are given of the ecology, maintenance in aquaria, and spawning of pseudochromids. As an appendix, a new name is proposed for *Pseudochromis punctatus* Kotthaus, 1970.

77-001409 Maughan, O. F. A SURVEY OF FISHES OF THE CLEARWATER RIVER. Northwest Sci. 50 (2): 76-86. May 1976. SFA 22(3)

[Va. Coop. Fish. Res. Unit, Dep. Fish. Wildl. Sci., VPI & SU, Blacksburg, VA 24061] The distribution of fishes of the Clearwater River in north central Idaho was studied. Nineteen fish species were collected. These species were *Salmo gairdneri*, *Salmo clarki*, *Salvelinus fontinalis*, *Salvelinus malma*, *Oncorhynchus tshawytscha*, *Protopomus williamsoni*, *Ptychocheilus oregonensis*, *Acrocheilus alutaceus*, *Rhinichthys osculus*, *Rhinichthys*

77-001409 CONTINUED

cataractae/, /Richardsonius balteatus/, /Catostomus columbianus/,
 /Catostomus macrocheilus/, /Lampetra tridentata/, /Micropterus
 dolomieu/, /Cottus bairdi/, /Cottus rhotheus/, /Cottus heldingi/, and
 /Cottus confusus/.

77-001410 Mikhaylin, S. V. CHARACTERISTICS OF THE DISTRIBUTION OF
 SOME MEMBERS OF THE FAMILIES GEMPYIIDAE AND TRICHIURIDAE IN THE WATERS
 OF SOUTHWEST AFRICA. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16
 (2): 319-323. 1976. SFA 22(3)
 [VNIRO, Moscow, USSR]

77-001411 Miller, R. R.; Soltz, D. L.; Sanchez, P. G. FISHES AND
 AQUATIC RESOURCES OF THE DEATH VALLEY SYSTEM, CALIFORNIA-NEVADA, 1878-
 1976. U.S. Dep. Interior, Natl. Park Serv., West. Reg., San
 Francisco, Calif. 27p. 1977. SFA 22(3)
 [Dep. Zool., Univ. Mich., Ann Arbor]

77-001412 Misitano, D. A. SPECIES COMPOSITION AND RELATIVE
 ABUNDANCE OF LARVAL AND POST-LARVAL FISHES IN THE COLUMBIA RIVER
 ESTUARY, 1973. NOAA Fish. Bull. 75 (1): 218-222. Jan. 1977. SFA
 22(3)
 [NMFS, Northwest Fish. Cent., 2725 Montlake Blvd. E., Seattle, WA
 98112]

77-001413 Numann, W. BESTIMMUNGSSCHLUESSEL FÜR BODENSEEFISCHE.
 [KEY TO THE FISH OF THE LAKE OF CONSTANCE.] Swiss J. Hydrol. 38 (2):
 239-245. 31 Dec. 1976. In German with English summ. SFA 22(3)
 [Landesanst. Umweltschutz, Boden-Württemberg, Inst. Seenforsch.
 Fischereiwis., D-7994 Langenargen, Switzerland] Difficulties and
 misunderstandings in the classification of the fish species of Lake
 Constance, especially of Cyprinidae and Coregoninae, induced us to
 work out a determination key. When basing a classification only on the
 number of gill rakers it was impossible to determine the Coregoninae.
 Further characteristics, even ones influenced by external factors,
 have been used, because these were combined contemporaneously with
 different genetic behaviour. The distribution of the Lake Constance
 Coregoninae on the 5 or 6 species recognized today has been corrected.

77-001414 Potter, W. A.; Malick, R. W., Jr.; Polk, J. L. THE
 COMPOSITION AND DISTRIBUTION OF FISHES OF THE SWATARA CREEK DRAINAGE,
 PENNSYLVANIA. Proc. Pa. Acad. Sci. 50 (2): 136-140. 1976. SFA 22(3)
 [Dep. Biol., VPI & SU, Blacksburg, VA 24061] The fishes of the
 Swatara Creek drainage in Berks, Dauphin, Lebanon, and Schuylkill
 Counties, Pennsylvania were investigated during June through October
 1975 coincident with studies to find yellow perch and shield darter
 populations and to determine the species composition of a large stream
 discharging near Three Mile Island Nuclear Station. Species were
 compared to those taken in other investigations in the Swatara Creek
 drainage and to those from the Susquehanna River downstream of the
 confluence with Swatara Creek. Composition, distribution, and
 diversity of fishes were examined and discussed.

SPORT FISHERY ABSTRACTS

77-001415 Richardson, S. L.; Percy, W. G. COASTAL AND OCEANIC FISH LARVAE IN AN AREA OF UPWELLING OFF YACUINA BAY, OREGON. NOAA Fish. Bull. 75 (1): 125-145. Jan. 1977. SFA 22(3)

[Sch. Oceanogr., Oreg. State Univ., Corvallis 973311 A 1 1/2-yr survey of planktonic fish larvae collected from 2 to 11 km off the mid-Oregon coast in 1971-72 yielded 287 samples which contained 23,578 individuals in 90 taxonomic groups, 78 identified at the species level. Two distinct faunal assemblages were found: a "coastal" assemblage 2 to 28 km offshore and an "offshore" assemblage 37 to 111 km from shore. The coastal group was dominated by Osmeridae, /Parophrys vetulus/, /Tropsetta isolepis/, and /Microgadus proximus/. The offshore group was dominated by /Sebastes/ spp., /Stenobranchius leucopsarus/, /Tarletonbeania crenularis/, /Tropsetta exilis/, and /Engraulis mordax/. Peak abundance in both assemblages occurred between February and July when greater than 90 percent of all larvae were taken. Larval distribution patterns in each assemblage were similar in 1971 and 1972, but larval abundance was greater in 1971 than 1972.--From abstr.]

77-001416 Schwartz, F. J.; Safrit, G. W., Jr. A WHITE SOUTHERN STINGRAY, /DASYATIS AMERICANA/ (PISCES, DASYATIDAE), FROM PAMLICO SOUND, NORTH CAROLINA. Chesapeake Sci. 18 (1): 83-84. Mar. 1977. SFA 22(3)

[Inst. Mar. Sci., Univ. N. Car., Morehead City 285571]

77-001417 Thomerson, J. E.; Thorson, T. B.; Hempel, R. L. THE BULLSHARK, /CARCHARHINUS LEICAS/, FROM THE UPPER MISSISSIPPI RIVER NEAR ALTON, ILLINOIS. Copeia 1977 (1): 166-168. 16 Mar. 1977. SFA 22(3)

[Dep. Biol. Sci., South. Ill. Univ., Edwardsville 620261]

77-001418 Van Couvering, J. A. H. EARLY RECORDS OF FRESHWATER FISHES IN AFRICA. Copeia 1977 (1): 163-166. 16 Mar. 1977. SFA 22(3)

[Univ. Colo. Mus., Boulder 803091]

77-001419 Verneaux, J. [BIOTYPELOGY OF RUNNING WATERS. THE BIOLOGICAL STRUCTURE.] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 283 (15): 1663-1666. Dec. 1976. In French with English summ. SFA 22(3)

[Lab. Hydroecol. C.T.G. R.E.F., Cent. Hydrobiol., Univ. Besancon, avenue de la Paix, 25000 Besancon, France] A statistical analysis of the distribution of 300 species of fish and benthic invertebrates, among 240 collecting stations which are distributed along 30 French rivers, shows up a succession of 10 socio-ecological clusters that go to make a biological organization of a running water ecosystem.

77-001420 Yeager, B. E.; Beadles, J. K. FISHES OF THE CANE CREEK WATERSHED IN SOUTHEAST MISSOURI AND NORTHEAST ARKANSAS. Proc. Ark. Acad. Sci. 30: 100-104. 1976. SFA 22(3)

[Neelyville High School, Neelyville, MO] A survey of the fishes of Cane Creek in southeast Missouri and northeast Arkansas was made between 25 August 1974 and 16 July 1975. Field collections, literature records, fisherman reports, and museum specimens showed the fishes of Cane Creek to be composed of 90 species distributed among 20 families. Records of /Lampetra aepyptera/ (Abbott), /Hiodon alosoides/ (Rafinesque), /Etheostoma histrio/ Jordan and Gilbert, and /Percina uranidea/ (Jordan and Gilbert) were either the first records of these species in this stream or reaffirmed their presence. The fish

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collected were common to the Ozark, Ozark-lowland, lowland, and wide-ranging faunal groups of Pflieger (1971). The Ozark faunal group was restricted primarily by topography and the confluence of Ten Mile Creek with Cane Creek. The lowland faunal group was influenced by fish migrating between Cane Creek and Black River. Channelization of lower Cane Creek in 1907 and 1908 undoubtedly influenced the immigration and emigration of fishes from Black River.

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

77-001421 Clady, M. D. DECLINE IN ABUNDANCE AND SURVIVAL OF THREE BENTHIC FISHES IN RELATION TO REDUCED OXYGEN LEVELS IN A EUTROPHIC LAKE. Am. Midl. Nat. 97 (2): 419-432. Apr. 1977. SFA 22(3)

[Okla. Coop. Fish Res. Unit, Okla. State Univ., Life Sciences West, Stillwater 74074] From 1959 through 1974, trawl catches in water deeper than 10.4 m indicated synchronous changes and overall declines in year-class recruitment of trout-perch (*Percopsis omiscomaycus*), tessellated darter (*Ptheostoma olmstedi*) and logperch (*Percina caprodes*) in Oneida Lake, New York. Abundance and survival of older individuals of these benthic species also declined. The proportion of the population of tessellated darters at deep, shallow and intermediate sites did not change significantly; but the trout-perch population became progressively concentrated at intermediate sites (6.4-10.7 m deep), although strong inshore movement was not evident during any single year. Abundance of year-classes of trout-perch and tessellated darters was significantly correlated ($P = .05$) with mean wind velocity during May-August and with mean oxygen levels near the bottom during July-August. Survival of older fish was also significantly correlated with wind velocity, but not strongly with oxygen levels. Declines in fish populations were attributed to abiotic factors, particularly worsening oxygen conditions in deeper water, and were closely related to wind velocity because of its moderating effects on thermal stratification and oxygen depletions.--From abstr.

77-001422 Dekhnik, T. V.; Sinyukova, V. I. SURVIVAL OF MARINE FISH LARVAE IN RELATION TO FOOD AVAILABILITY. J. Ichthyol. (Encl. Transl. Vopr. Ikhtiol.) 16 (2): 294-302. 1976. SFA 22(3)

[INBYUM, Sevastopol, USSR] The significance of the food supply to the larvae of marine fishes is examined in relation to their survival and year-class abundance. An analysis is made of the case for the conclusions regarding the food supply to the larvae of some Black Sea and Azov Sea fishes. It was demonstrated that when deciding questions concerning food availability, corresponding changes in individual indicators, selected from a ramified system should not be taken as a basis.

77-001423 Hokanson, K. F. P.; Kleiner, C. P.; Thorslund, T. W. EFFECTS OF CONSTANT TEMPERATURES AND DIEL TEMPERATURE FLUCTUATIONS ON SPECIFIC GROWTH AND MORTALITY RATES AND YIELD OF JUVENILE RAINBOW TROUT, *SALMO GAIRDNERI*. J. Fish. Res. Board Can. 34 (5): 639-648. May 1977. In English with French summ. SFA 22(3)

[U.S. EPA, Monticello, MN 55362]

77-001424 Jones, D.; Clare, J. ANNUAL AND LONG-TERM FLUCTUATIONS IN THE ABUNDANCE OF FISH SPECIES INHABITING AN INTERTIDAL MUSSEL BED IN MORECAMBE BAY, LANCASHIRE. Zool. J. Linn. Soc. 60 (2): 117-172. Mar. 1977. SFA 22(3)

[30 Rylstone Dr., Morecambe, Lancashire, England] Seasonal changes in the abundance of fish species inhabiting an intertidal mussel bed in Morecambe Bay, Lancashire, were studied from 1956 to 1977 (excluding 1962). Species distribution was to some extent governed by the availability of suitable habitats. Competition for living space created by high numbers of a particular species resulted in an extension of its normal vertical distribution pattern. Correlations between seasonal migrations and sea temperatures or suggested breeding periods are postulated. The effects of the severe winter of 1962-63 are compared with published information from other locations around the British Isles.

77-001425 Jorgensen, C. B. AUGUST PUTTER, AUGUST KROGH, AND MODERN IDEAS ON THE USE OF DISSOLVED ORGANIC MATTER IN AQUATIC ENVIRONMENTS. Biol. Rev. (Camb.) 51 (3): 291-328. Aug. 1976. SFA 22(3)

[Zool. Lab. A, August Krogh Inst., Universitetsparken 13, DK-2100, Copenhagen O, Denmark]

77-001426 Mearns, A. J.; Smith, L. BENTHIC OCEANOGRAPHY AND THE DISTRIBUTION OF BOTTOM FISH OFF LOS ANGELES. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 118-124. May 1976. SFA 22(3)

[South. Calif. Coastal Water Res. Proj., El Segundo, CA 90245] Changes in bottom water isotherms of the coastal shelf appear to have a direct effect on the abundance and diversity of demersal fishes and invertebrates. These changes are also highly correlated with near-bottom dissolved oxygen concentrations. In addition, resident fauna of the shelf can experience warmer water in winter than in summer. These effects are probably caused by incursion of offshore basin waters onto the coastal shelf following development of the thermocline. Recognition of these events may aid in clarifying and defining (a) shelf community structure, (b) our concept of the terms "near-shore" and "off-shore", and (c) monitoring and survey programs adequate for separating natural from man-induced effects.

77-001427 Miller, P. E. EXPERIMENTAL STUDY AND MODELING OF STRIPED BASS EGG AND LARVAL MORTALITY. Ph.D. dissertation, Johns Hopkins Univ. 109p. 1977. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001428 Moyle, P. B. IN DEFENSE OF SCULPINS. Fisheries (Bull. Am. Fish. Soc.) 2 (1): 20-23. Jan.-Feb. 1977. SFA 22(3)

[Univ. Calif., Davis] The limited evidence available indicates that sculpins can severely limit salmonid populations through either predation or competition only under exceptional or artificial conditions. Probably the most severe damage by sculpins takes place in situations where man has already badly damaged the salmonid populations through over-exploitation or environmental disturbances. Obviously, more definitive work needs to be done on sculpin-salmonid interactions in streams, particularly in natural or near-natural situations, before sculpins can be condemned as being responsible for salmonid declines.--From concl.

77-001429 Noble, R. L.: Germany, P. D.; Hall, C. F. INTERACTIONS OF BLUE TILAPIA AND LARGEMOUTH BASS IN A POWER PLANT COOLING RESERVOIR. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 247-251. 1975[1976]. SFA 22(3)

[Dep. Wildl. Fish. Sci., Texas A&M Univ., College Station 77843] In the presence of a dense population of blue tilapia, the population of northern largemouth bass declined in three years to one-third its 1972 abundance in Trinidad Lake, Texas. A pond experiment with Florida largemouth bass indicated that bass failed to reproduce successfully at a tilapia density of 2000 lb/A, but at 1000 lb/A some bass spawning occurred. Trends in gonosomatic indices suggest that eggs were retained by bass at high tilapia densities.

77-001430 Sohn, J. J. THE CONSEQUENCES OF PREDATION AND COMPETITION UPON THE DEMOGRAPHY OF /GAMBUSIA MANNI/ (PISCES: POECILIIDAE). Copeia 1977 (2): 224-227. 25 May 1977. SFA 22(3)

[Mus. Comp. Zool., Harvard Univ., Cambridge, MA 02138] Krumbholz proposed that predation and competition affected the survivorship and fertility schedules of /Gambusia manni/ at Bimini, Bahamas. He showed that in predator exposed populations the sex ratio was lower, no senile individuals were present, the number of offspring per brood was higher and that in males there was a definite shift in the size at maturity. He was unable to explain the shift in the size at maturity by use of the predation and competition hypothesis. New information on the forces affecting maturity in the poeciliid fishes is used to demonstrate that this unexplained demographic variable can be plausibly explained by the predation-competition hypothesis. I demonstrate that the size at maturity is functionally related to the presence of an adult male and that maturation is delayed until a juvenile exceeds the adult male in size.

77-001431 Spangler, G. R. MORTALITY FACTORS AND DYNAMICS OF A LAKE HURON LAKE WHITEFISH POPULATION. Ph. D. dissertation, Univ. Toronto (Canada) 1974. From Diss. Abstr. Int. B Sci. Eng. 37(12), 1977. SFA 22(3)

Whitefish were tagged and released from pound nets during the summers of 1964-68 and mortality of the tagged fish was estimated by mark-recapture methods at successive intervals throughout the season. Summer mortality rates of 81, 94, and 99 percent were estimated for ages 2, 3, and 4 respectively, while over-winter mortalities were 20, 63, and 92 percent, respectively. Fishing-induced mortality was relatively light compared to other factors. Lamprey predation in northern Lake Huron as indicated by freshly wounded whitefish in the commercial catch is at a minimum in May and June, rising to maximum levels in August and September. Estimates of lamprey-induced mortality obtained for 3-5 year old whitefish indicated that lamprey predation in the absence of other factors could account for a 70 percent mortality from June to November. During this period, 92 percent of the lamprey attacks on whitefish age 3 and older are fatal. Growth rates and the maturation schedule for this population compare favorably with figures reported for other exploited populations of whitefish in the Great Lakes.--From abstr.



SPORT FISHERY ABSTRACTS

77-001432 Stearns, S. C. LIFE HISTORY TRAITS IN STABLE AND FLUCTUATING ENVIRONMENTS: /GAMBUSIA AFFINIS/ IN HAWAII. Ph. D. dissertation, Univ. British Columbia 1976. From Diss. Abstr. Int. B Sci. Eng. 37(7), 1977. SPA 22(3)

Laboratory results led me to the following conclusions: (1) The life history traits of /Gambusia/ have evolved, since 1905, in different directions in different reservoirs. A detectable and significant portion of the variability among stocks had a genetic basis. (2) In the fluctuating reservoirs, /Gambusia/ are undergoing oscillating selection pressures on age at maturity and growth rate. They cope with these pressures by producing young with a great range of growth rates and ages at maturity.--From abstr.

77-001433 Yakovlev, V. N.; Prits, S. E. ALLOWANCE FOR THE EFFECT OF HYDROMETEOROLOGICAL FACTORS ON FISH CATCH DYNAMICS (TAKING THE NORTH SEA HERRING, /CLUPEA HARENGUS HARENGUS/, AS AN EXAMPLE). J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 163-165. 1976. SPA 22(3)
[AtlantNRO, Kaliningrad, USSR]

IDENTIFICATION, KEYS, CLASSIFICATION

77-001434 Akhundov, A.-D. G.; Mednikov, B. M. SYSTEMATIC POSITION OF THE CARTILAGINOUS GANOID /POLYODON SPATHULA/ (WALBAUM) (PISCES, CHONDROSTEI). Dokl. Biol. Sci. (Engl. Transl. Dokl. Akad. Nauk SSSR Ser. Biol.) 228 (1-6): 271-272. Dec. 1976. SPA 22(3)

[M. V. Lomonosov State Univ., Moscow, USSR] From this it may be concluded that paddlefishes really are the closest living relatives of the sturgeons. However, the degree of divergence of their DNA's is higher than that considered appropriate for families. Paddlefishes comprise an order closest to the order of sturgeons. However, if the divergence of DNA homology reaches interordinal rank between members within the group studied, it is only logical to confer the rank of class upon the group.

77-001435 Balushkin, A. V. A REVIEW OF THE "/LARSENI/" GROUP OF SPECIES OF THE GENUS /NOTOTHENIA/ PICH. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 1-12. 1976. SPA 22(3)

[Zool. Inst., Acad. Sci., Leningrad, USSR] As a result of revision of /Notothenia larseni/, based on detailed morphological comparisons, three new species are described: /N. nybelini/ from the Western Antarctic (Graham Land with the adjoining islands), /N. loesha/ from the Eastern Antarctic (Balleny Islands) and /N. tchizh/ from the sub-Antarctic regions of the Indian Ocean. A description of the species and an identification key are given. The species described are considered as a species group of "/larseni/", morphologically clearly distinguishable from the "/Squamifrons/" species group and from all other species of the genus /Notothenia/.

77-001436 Beamish, P. J.; Crossman, E. J. VALIDITY OF THE SUBSPECIES DESIGNATION FOR THE DWARF WHITE SUCKER (/CATOSTOMUS COMMERSONI UTAWANA/). J. Fish. Res. Board Can. 34 (3): 371-378. Mar. 1977. In English with French summ. SPA 22(3)

[Fish. Mar. Serv., Biol. Stn., Nanaimo, BC V9R 4K6, Canada]

77-001437 Black, G. F. NOTES ON SOME FISHES COLLECTED OFF THE OUTER COAST OF BAJA CALIFORNIA. Calif. Fish Game 63 (1): 71-72. Jan. 1977. SFA 22(3)

[Oper. Res. Br., Calif. Dep. Fish Game, 350 Golden Shore, Long Beach 90802]

77-001438 Bohlke, J. E.; Bohlke, F. B. A NEW MORAY, /GYMNOTHORAX HUBBSI/ (ANGUILLIFORMES, MURAEIDAE), FROM THE WESTERN NORTH ATLANTIC. Bull. Mar. Sci. 27 (2): 237-240. Apr. 1977. SFA 22(3)

[Dep. Ichthyol., Acad. Nat. Sci. Phila., 19th & Parkway, Philadelphia, PA 19103] A distinctively-patterned, small (the largest specimen 306 mm TL; a 220-mm female with eggs) western Atlantic moray with serrated teeth is described and illustrated based on nine specimens. Its known distribution is restricted to the east coast of Florida from Daytona Beach to Key Largo, plus a specimen from Havana, Cuba, and another from the western edge of the Great Bahama Bank. The known depth range of the species is 32 to 50 fathoms, except for the Bahama specimen from "outside 100 fathoms."

77-001439 Rouchard, R. W. /ETHEOSTOMA ETNIERI/, A NEW PERCID FISH FROM THE CANEY FORK (CUMBERLAND) RIVER SYSTEM, TENNESSEE, WITH A REDESCRIPTION OF THE SUBGENUS /ULOCENTRA/. Tulane Stud. Zool. Bot. 19 (3,4): 105-130. Mar. 1977. SFA 22(3)

[Box 5076, Dep. Biol., Univ. North Ala., Florence 35630] The subgenus /Ulocentra/ is diagnosed and redescribed. /Etheostoma etnieri/, a new darter of the subgenus /Ulocentra/ (Percidae, Etheostomatini), is described from the Caney Fork (Cumberland) River system in Tennessee and is compared with the nominal /E. atripinne/, /E. duryi/ and /E. simoterum/. This brightly colored, sexually dichromatic darter is more closely allied to /E. duryi/ than any other nominal /Ulocentra/. /Etheostoma etnieri/ differs from /E. duryi/ mainly in modal number of caudal peduncle scales and pigmentation of the body and fins and from Cumberland River basin /E. atripinne/ in having fewer dorsal saddles, usually a poorly developed premaxillary frenum and in pigmentation of the body and fins. /Etheostoma etnieri/ also has fewer lateral-line scales compared to /E. atripinne/ from the Caney Fork River system. Range, relationship, size, fish associates and ecological data are presented.

77-001440 Burgess, G. H.; Gilbert, C. R.; Guillory, V.; Taphorn, D. C. DISTRIBUTIONAL NOTES ON SOME NORTH FLORIDA FRESHWATER FISHES. Fla. Sci. 40 (1): 33-41. 1977. SFA 22(3)

[Fla. State Mus. Dep. Zool., Univ. Fla., Gainesville 32611] Recent captures of /Notropis cummingsae/, /Notropis welaka/, /Ictalurus brunneus/, and /Etheostoma olmstedii/ from waters of the St. Johns River drainage are reported, and the disjunct distributions of these species in Florida are discussed. Freshwater distribution of /Lucania parva/ in the St. Johns River system is summarized, with a new locality included. Establishment of two exotic fish species, /Xiphophorus variatus/ and /Sarotherodon aureus/ (= /Tilapia aurea/), in Gainesville is documented. Known range of /Enneacanthus chaetodon/ is extended to Pasco county.

77-001441 Colman, J. A. /ARNOGLOSSUS HOOPS/ (HECTOR): A SYNONYM OF /A. SCAPHA/ (SCHNEIDER) (PISCES: PTEROSOMATA: POTHIDAE). N. Z. J. Mar. Freshwater Res. 10 (4): 693-697. Dec. 1976. SFA 22(3)

[Fish. Res. Div., Minist. Agric. Fish., P.O. Box 19-062, Wellington, New Zealand] The unique holotype of /Arnoglossus hoops/ Hector is compared with specimens of /Arnoglossus scapha/ (Schneider). It is concluded that the two species are identical, and that /A. hoops/ is therefore a junior synonym of /A. scapha/.

77-001442 Dawson, C. P. A NEW WESTERN ATLANTIC WORMFISH (PISCES: MICRODESMIIDAE). Copeia 1977 (1): 7-10. 16 Mar. 1977. SFA 22(3)

[Gulf Coast Res. Lab., Mus., Ocean Springs, MS 39564] /Microdesmus luscus/ n. sp., closely related to /M. lanceolatus/ (Gulf of Mexico), /M. hildebrandi/ and /M. multiradiatus/ (Eastern Pacific), is described from Caribbean waters. A key is provided to Western Atlantic species of /Microdesmus/.

77-001443 Dawson, C. P. PREVIEW OF THE PIPEFISH GENUS /CORYTHOICHTHYS/ WITH DESCRIPTION OF THREE NEW SPECIES. Copeia 1977 (2): 295-338. 25 May 1977. SFA 22(3)

[Gulf Coast Res. Lab. Mus., Ocean Springs, MS 39564]

77-001444 Fink, W. L. EVOLUTION AND SYSTEMATICS OF FISHES IN THE STOMIATOIDEA (SALMONIFORMES: STOMIATOIDEI), BASED ON OSTEOLOGY OF THE FINS. Ph. D. dissertation, George Washington Univ. 445p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(11), 1977. SFA 22(3)

77-001445 Gilbert, C. P. STATUS OF THE WESTERN SOUTH ATLANTIC APOGONID FISH /APOGON AMERICANUS/, WITH REMARKS ON OTHER BRAZILIAN APOGONIDAE. Copeia 1977 (1): 25-32. 16 Mar. 1977. SFA 22(3)

[Fla. State Mus., Univ. Fla., Gainesville 32611] The Brazilian apogonid fish /Apogon americanus/ Castelnau has, until now, been poorly known. Acquisition of recently collected material now permits a redescription of the species, which is closely related to the widespread /A. maculatus/ (Poey) and is the allopatric replacement for that species in the isolated inshore reefs along the Brazilian coast and adjacent offshore islands. Specimens from Brazil previously identified as /Apogon maculatus/ are /A. pseudomaculatus/ Longley. The only other shallow-water apogonid species known from this area are /Astrapogon puncticulatus/ (Poey) and /Phaeoptyx pigmentaria/ (Poey), although additional collecting effort, particularly from deeper reef areas offshore, may show other species of Apogonidae to be present.

77-001446 Gosztonyi, A. P. RESULTS OF THE RESEARCH CRUISES OF FRY "WALTHER HERWIG" TO SOUTH AMERICA. XVIII. REVISION OF THE SOUTH AMERICAN ZOARCIDAE (OSTRICHTHEYS, BLENNIOIDEI) WITH THE DESCRIPTION OF THREE NEW GENERA AND FIVE NEW SPECIES. Arch. Fischereiwiss. 27 (3): 191-249. Mar. 1977. In English with German and Spanish summ. SFA 22(3)

[Inst. Invest. Biofis., Cons. Mar. Invest. Cient. Tec., Buenos Aires, Argentina]

77-001447 Henslev, D. A.; Smith, G. B. ADDITIONAL DATA ON THE POMACENTRID FISH /CHROMIS SCOTTI/. Copeia 1977 (2): 391-393. 25 May 1977. SFA 22(3)

[Fla. Dep. Nat. Resour. Mar. Res. Lab., 100 8th Ave. SE, St. Petersburg 337011]

77-001448 Maisey, J. G. THE FOSSIL SELACHIAN FISHES /PALAEOSPINAX/ EGERTON, 1872 AND /NEMACANTHUS/ AGASSIZ, 1837. Zool. J. Linn. Soc. 60 (3): 259-273. Apr. 1977. SFA 22(3)

[St. Albans Coll., Hatfield Rd., St. Albans, Herts., England]

77-001449 Markle, D. F. PRELIMINARY STUDIES ON THE SYSTEMATICS OF DEEP-SEA ALEPOCEPHALOIDEA (PICES: SALMONIFORMES). Ph.D. dissertation, Coll. William and Mary in Va. 240 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

77-001450 McDowall, R. M. THE STATUS OF THE SOUTH AFRICAN GALAXIID (PISCES, GALAXIIDAE). Ann. Cape Prov. Mus. Nat. Hist. 9 (5): 91-101. 31 Jan. 1975. SFA 22(3)

[Fish. Res. Div., Box 19062, Wellington, New Zealand] Study of general morphology and osteology shows that the South African galaxiid belongs in the genus /Galaxias/. /Agalaxis/ Scott is a synonym of /Galaxias/. Data also support earlier opinions that there is only one variable species of /Galaxias/ in South Africa--/G. zebatus/ (Castelnau)--which is described and figured.

77-001451 McFachran, J. D.; Stehmann, M. SURGENERIC PLACEMENT OF /RAJA BATHYPHILA/ BASED ON ANATOMICAL CHARACTERS OF THE CLASPER, CRANIUM AND PELVIC GIRDLE. Copeia 1977 (1): 20-25. 16 Mar. 1977. SFA 22(3)

[Dep. Wildl. Fish. Sci., Texas A&M Univ., College Station 778431] The external morphology and internal anatomy of the clasper of /R. bathyphila/ are described, along with the structure of the neurocranium and pelvic girdle. Based on these components /R. bathyphila/ closely resembles the subgenera /Leucoraja/ and /Rajella/. /Raja bathyphila/ is placed within /Rajella/ because it lacks a promontory and roll and possesses a pent in the clasper glans. Also the dorsal marginal cartilage and dorsal terminal cartilages 2 and 3 are more similar to those of /Rajella/ than /Leucoraja/. Within /Rajella/, /R. bathyphila/ is most similar to /R. fyllae/ and /R. sadowskii/.

77-001452 Moser, H. G.; Ahlstrom, F. H.; Sandknop, F. M. GUIDE TO THE IDENTIFICATION OF SCORPIONFISH LARVAE (FAMILY SCORPAENIDAE) IN THE EASTERN PACIFIC WITH COMPARATIVE NOTES ON SPECIES OF /SEBASTES/ AND /HELICOLENUS/ FROM OTHER OCEANS. NOAA Tech. Rep. NMFS Circ. 402. v + 71 p. Apr. 1977. SFA 22(3)

[NMFS, Southwest Fish. Cent., La Jolla, CA 92038]



77-001453 Perez, J. F.; Cervigon, P.; Cequea, H.; Gonzalez, D.; Padron, M.; Subero, L. ESTUDIO DE LAS RELACIONES TAXONOMICAS DE ALGUNOS GENEROS DE LA FAMILIA ENGAEULIDAE (PISCES) BASADO EN CARACTERES BIOQUIMICOS. [STUDIES OF TAXONOMIC RELATIONS OF SOME GENERA OF THE FAMILY ENGAEULIDAE (PISCES) BASED ON BIOCHEMICAL CHARACTERISTICS.] Bol. Inst. Oceanogr. Univ. Oriente Cumana 14 (2): 227-232. Dec. 1975. In Spanish with English summ. SFA 22(3)
[Dep. Biol., Univ. Oriente, Cumana, Venezuela]

77-001454 Potter, I. C.; Osborne, T. S. THE SYSTEMATICS OF BRITISH LARVAL LAMPREYS. J. Zool. (Lond.) 176 (3): 311-329. July 1975. SFA 22(3)

[Sch. Biol. Sci., Univ. Bath, Claverton Down, Bath, Somerset, England] Several taxonomic characters, including the number of trunk myomeres, proportional body measurements and patterns of external and internal pigmentation, have been investigated in populations of ammocoetes belonging to the three species of lampreys found in British rivers. *Petromyzon marinus* can be readily distinguished by the pigmentary pattern in the tail and on the oral hood, and by the much higher number of trunk myomeres. Although no character can be used to separate with certainty the larvae of *Lampetra fluviatilis* and *Lampetra planeri*, significant differences were found between the mean number of trunk myomeres in the two species. Moreover, the values for ammocoetes were virtually identical to those of the respective post-larval stages, at which phase in the life cycle the two *Lampetra* species are clearly distinguishable. The incidence of pigmentation on the tongue precursor was much higher in larval populations of *L. fluviatilis* than in those of *L. planeri* and there was also a difference in the rate of change in the relative length of the trunk and tail. Where comparisons can be made, the results in this paper are in agreement with those of most other European and North American workers. The data differ markedly, however, from that contained in the only other previous detailed systematic study on British larval lampreys, which was subsequently used as the basis for taxonomic keys.

77-001455 Richards, W. J.; Saksena, V. P. SYSTEMATICS OF THE GURNARDS, GENUS *LEPIDOTRIGIA* (PISCES, TRIGLIDAE), FROM THE INDIAN OCEAN. Bull. Mar. Sci. 27 (2): 208-222. Apr. 1977. SFA 22(3)

[NMFS, 75 Virginia Beach Dr., Miami, FL 33149] The triglid fishes, genus *Lepidotrigla*, from the Indian Ocean are revised. We have treated eight species, one of which is described as new, and provided a key for their identification. Individual species accounts include diagnoses, synonymies, status of type material, material examined, and taxonomic comment where appropriate.

77-001456 Savvaitova, K. A. THE CHARs (GENUS *SALVELINUS*) OF LAKE NACHIKIN (KAMCHATKA) AND SOME SYSTEMATIC PROBLEMS OF Holarctic LAKE CHARs. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 238-246. 1976. SFA 22(3)

[Dep. Ichthyol., Moscow Univ., USSR] Data are presented on color polymorphism, feeding, age and growth, reproduction and morphometry of the lake char population of Lake Nachikin, which has not been previously studied. A comparison of this char is made with populations of a similar lake char from Lake Dal'neye in Kamchatka and with lake chars from all regions of the range of the genus *Salvelinus*. Certain possible explanations of the diversity of lake chars and interpretations of their systematic position are put forward. The author concludes that the overwhelming majority of lake chars of Kamchatka, and also the chars from other regions of the Holarctic are lacustrine ecotypes of one species, *S. alpinus*.

SPORT FISHERY ABSTRACTS

77-001457 Seehorn, M. E. FISHES OF SOUTHEASTERN NATIONAL FORESTS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 10-27. 1975[1976]. SFA 22(3)

[U.S. Forest Serv., Atlanta, GA] A survey of fish on 33 southeastern National Forests was conducted during the period July 1972 through July 1975. Of the 470 species listed, 442 are recognized in American Fisheries Society Special Publication No. 6. Another 28 species or groups of species, recognized or under study since this publication, are also included. The Shortnose sturgeon, *Acipenser brevirostrum*, is the only fish on the current endangered or threatened register likely found on the Forests, although 20 species of known or probable occurrence on National Forest lands have been recommended for such status.

77-001458 Shcherbachev, Yu. N. NEW SPECIES OF THE FAMILY APHYONIDAE (PISCES, OPHIDIIDAE) FROM THE INDIAN OCEAN. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 146-149. 1976. SFA 22(3)
[IOAN, Moscow, USSR]

77-001459 Smith, C. V.; Tyler, J. C. REDESCRIPTION OF THE GOBIID FISH *CORYPHOPTERUS LIPERNES* BOHLKE AND ROBINS, WITH NOTES ON ITS HABITS AND RELATIONSHIPS. Am. Mus. Novit. 2616. 10p. 13 Apr. 1977. SFA 22(3)

[Dep. Ichthyol., Am. Mus. Nat. Hist., Central Park West at 79th St., New York, NY 10024] The bluenose goby, *Coryphopterus lipernes* Bohlke and Robins, was described in 1962 from three specimens collected in the Florida Keys; it has remained poorly known since that time. Recent collections and observations indicate that this species is widespread in the Caribbean and Bahamas but at low population densities wherever it occurs. It is also one of the few species of western Atlantic reef fishes that lives in relatively continuous close physical contact with live corals. All the individuals, observed at night and during the day, spent most of the time resting on live corals, with only a few brief forays onto nearby algal mats, or off the coral to feed. In this respect, the bluenose goby is an ecological counterpart of the Indo-Pacific clownfishes (*Amphiprion*). The mechanism by which the bluenose goby avoids being stung by the nematocysts of the coelenterates may not be the same as that of the clownfishes because clownfishes become acclimated to individual anemones, whereas the bluenose goby can move freely back and forth among coral colonies of both the same and different species. Other species of fishes associated with live corals in the West Indies share with the bluenose goby certain features that we interpret to be specializations for this way of life. Within the genus *Coryphopterus*, two divergent lineages show progressive specialization toward coral-dwelling, on the one hand, and toward sand-dwelling on the other.

77-001460 Smith, M. M. A NEW SPECIES OF *ARGYROSOMUS* (PISCES, SCIAENIDAE) FROM NATAL, SOUTH AFRICA. J. Zool. (Lond.) 181 (4): 561-566. Apr. 1977. SFA 22(3)

[J. L. R. Smith Inst. Ichthyol., Rhodes Univ., Grahamstown, Republic of South Africa]

SPORT FISHERY ABSTRACTS

77-001461 Sontirat, S. REVISION OF THE SOUTHEASTERN ASIATIC CYPRINID FISH GENUS /CYCLOCHPLICHTHYS/. Ph.D. dissertation, Univ. Mich. 140 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001462 Srinivasa Rao, K.; Ganapati, P. N. DESCRIPTION OF THE POST-LARVAE AND JUVENILES OF /SCOMBEROMORUS LINEOLATUS/ (CUVIER & VALFNCIENNES, 1831) FROM INDIAN WATERS. J. Nat. Hist. 11 (1): 101-111. Jan.-Feb. 1977. SFA 22(3)
[Dep. Zool., Andhra Univ., Waltair, Visakhapatnam-3, India]

77-001463 Troost, D. G. ON A MISLEADING DISPARITY BETWEEN THE ORIGINAL (1931) AND REPRINTED (1972) VERSIONS OF DELSMAN'S PAPER CONCERNING /STOLEPHORUS/ EGGS. copeia 1977 (2): 390-391. 25 May 1977. SFA 22(3)
[IOCARIBE, P.O. Box 812, Port of Spain, Trinidad and Tobago]

77-001464 Trunov, I. A. NEW SPECIES AND SPECIES RECORDED FOR THE FIRST TIME IN THE PELAGIC AREA OF THE TROPICAL ATLANTIC OF THE FAMILIES SERRANIDAE, EMMELICHTHYIDAE AND ARIOMMIDAE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 229-238. 1976. SFA 22(3)
[AtlantNIRO, Kalininograd, USSR] Four new fish species are described for the pelagic region of the tropical Atlantic: two of the family Serranidae and one each of the families Emmelichthyidae and Ariommidae. The species /Ariomma melanum/ (Ginsburg, 1954) was discovered here for the first time. Descriptions and comparative characteristics are presented.

77-001465 Williams, H. M. CHARACTERISTICS FOR DISTINGUISHING WHITE BASS, STRIPED BASS AND THEIR HYBRID (STRIPED BASS X WHITE BASS). Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 168-172. 1975[1976]. SFA 22(3)
[S. Car. Wildl. Mar. Resour. Dep. Abbeville 29620] Previously reported meristics, made from small specimens of these fishes, were found to be inadequate for positive identification; therefore, new methods and means of measurement were investigated. Measurements were taken from 214 white bass /Morone chrysops/ (Rafinesque), 224 striped bass /Morone saxatilis/ (Walbaum), and 204 hybrids (striped bass x white bass) from six upstate South Carolina reservoirs. The fish were from numerous year classes and both sexes. Specimens ranged in length from 127mm. to 889 mm. and weighed from 23 grams to 8,172 grams. Fork length/body depth and body depth/head length ratios plus type of tooth patches on tongue indicate positive means of identification.

77-001466 Wood, E. M. A REVIEW OF DAMSEL FISHES (PISCES: POMACENTRIDAE) OF THE GENUS /CHROMIS/ FROM THE CENTRAL AND EASTERN ATLANTIC AND THE MEDITERRANEAN. J. Fish Biol. 10 (4): 331-345. Apr. 1977. SFA 22(3)
[Biol. Sci. Dep., Univ. London Goldsmiths' Coll., Lewisham Way, London, SE14 6NW, England] The specific status of the damsel fish /Chromis chromis/ (L.) is discussed and it is suggested that /Chromis chromis/ is retained for Mediterranean specimens and that /Chromis limbatus/ is re-introduced for the East Atlantic form. Behavioural and morphological differences which distinguish these two species are given. A key to these and other East Atlantic /Chromis/ is provided, the species are described and their geographical range discussed.

PARASITES AND DISEASES-GENERAL

77-001467 Baker, J. C.; Crites, J. L. PARASITES OF CHANNEL CATFISH, /ICTALURUS PUNCTATUS/ RAFINESQUE, FROM THE ISLAND REGION OF WESTERN LAKE ERIE. Proc. Helminthol. Soc. Wash. 43 (1): 37-39. Jan. 1976. SFA 22(3)

[Dep. Zool., Ohio State Univ., Columbus 43210] Twenty species of parasites were recovered from 178 /Ictalurus punctatus/ from the island region of western Lake Erie. /Allacanthocasmus varius/ Van Cleave, 1922, and /Neoechinorhynchus rutili/ Mueller, 1790, represent new host records. /Achtheres micropteri/ Wright, 1882, and /Illinoibdella alba/ Meyer, 1940, are reported from channel catfish in Lake Erie for the first time.

77-001468 Baker, R. O. AN ECOLOGICAL STUDY OF PARASITISM IN ESTUARINE FISHES. Ph.D. dissertation, Univ. Calif. (Santa Barbara). 238 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

This study presents an analysis of gill parasitism in estuarine fishes at three ecological levels: i.e., the habitat, subhabitat, and microhabitat. The study was conducted in two southern California estuaries. The study results suggest that gill parasites reflect the host's macroenvironment, and that parasites are more sensitive than their hosts to adverse environmental factors. A complex of factors, biotic and abiotic, determine the gill parasite-mix of a fish. It is concluded that gill parasites of fishes may be useful as environmental indicators and bioassay screening organisms. Future avenues of research are considered.--From abstr.

77-001469 Beacham, B. E.; Haley, A. J. SOME PARASITES OF THE WHITE PERCH, /MORONE AMERICANA/ (GÜNTHER), IN CHESAPEAKE BAY. Proc. Helminthol. Soc. Wash. 43 (2): 232-233. July 1976. SFA 22(3)
[Baltimore City Hosp., Dep. Med., Baltimore, MD 21224]

77-001470 Ghittino, P. THE VETERINARIANS'S ROLE IN FISH CULTURE AND FISH PATHOLOGY. Riv. It. Piscic. Ittiop. 12 (1): 23-25. Jan.-Feb.-Mar. 1977. SFA 22(3)
[Ist. Zooprof. Sper., Via Bologna, 148-10154 Torino, Italy]

77-001471 Lang, B. Z.; Edson, S. A. PARASITES OF THE WESTERN SPECKLED DACE FROM EASTERN WASHINGTON. J. Parasitol. 62 (1): 93. Feb. 1976. SFA 22(3)
[Dep. Biol., East. Wash. State Coll., Cheney 99004]

77-001472 Mokhayer, B. FISH DISEASES IN IRAN. Riv. It. Piscic. Ittiop. 11 (4): 123-128. Oct.-Nov.-Dec. 1976. In English with Italian summ. SFA 22(3)
[Fac. Vet. Med., P.O. Box 3262, Tehran, Iran]

77-001473 Moller, H. REDUCTION OF THE INTENSTINAL PARASITE FAUNA OF MARINE FISHES IN CAPTIVITY. J. Mar. Biol. Assoc. U. K. 56 (3): 781-785. Aug. 1976. SFA 22(3)

[Inst. Meereskunde, Univ. Kiel, Kiel, West Germany] Thirty-one /Gadus morhua/, 36 /Zoarces viviparus/, 52 /Myoxocephalus scorpius/, and 35 /Platichthys flesus/ were kept for 46 (/G. morhua/) and 76 days respectively (other species) in aquaria. During this period the loss of 5 frequent intestinal parasite species was observed. The rate of ejection was high for parasites that feed on the host's pre-digested food and generally are not or only slightly attached to the intestinal wall (/Contracaecum aduncum: 93.1 percent, /Echinorhynchus gadi: 84.5 percent). The loss of mucosa-feeding /Cucullanus heterochrous/ was considerably lower (38.2 percent). The lowest rate of ejection was found for the plathelminth species /Podocotyle atomon/ (13.9 percent) and /Bothriocephalus scorpii/ (6.5 percent). A solitary feeding with parasite-free food had no influence on the loss of intestinal parasites.

77-001474 Natarajan, P.; James, P. S. B. P. A BIBLIOGRAPHY OF PARASITES AND DISEASES OF MARINE AND FRESHWATER FISHES OF INDIA. J. Fish Biol. 10 (4): 347-369. Apr. 1977. SFA 22(3)

[Univ. Agric. Sci., Coll. Fish., Mangalore, India] A total of 531 references on the parasites and diseases of marine and freshwater fishes of India which appeared in 90 scientific journals have been documented.

77-001475 Paperna, I.; Colorni, A.; Gordin, H.; Kissil, G. W. DISEASES OF /SPARUS AURATA/ IN MARINE CULTURE AT FLAT. Aquaculture 10 (3): 195-213. Mar. 1977. SFA 22(3)

[H. Steinitz Mar. Biol. Lab., Hebrew Univ., Flat, Israel] The predominant diseases occurring in /Sparus aurata/ cultured in sea water at Elat were bacteria-contaminated skin lesions, gill rot and septicemia. These developed mainly in fish stressed and injured following handling. Bacteria involved were Gram-negative and myxobacteria which were controlled by application of Nitrofurazone. Ectoparasitic infections were generally sporadic and insignificant, however, on three occasions the ciliate /Trichodina/ sp. and the monogenean /Furnestia echeneis/ caused morbidity and mortality of epizootic proportion. Ectoparasites were successfully controlled by application of formalin. A diet-related disease, visceral granuloma, appeared in fish fed on certain artificial diets containing fish meal but not in fish fed on fresh mussels or fish meat. Pathological symptoms included extreme granuloma following hypertrophy of the kidneys and spleen and focal lesions in other organs. Hatchery-bred fish suffered from episodes of extreme infections of epitheliocystis, the monogenea /F. echeneis/, gill rot due to myxobacteria and skeletal deformations coupled with tumours of the swim bladder.

77-001476 Plumb, J. A. AN 11-YEAR SUMMARY OF FISH DISEASE CASES AT THE SOUTHEASTERN COOPERATIVE FISH DISEASE LABORATORY. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 254-260. 1975[1976]. SFA 22(3)

[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830] An 11-year summary of fish disease case work at the Southeastern Cooperative Fish Disease Laboratory is presented. A total of 1,573 cases were examined. Approximately 61 percent of these cases occurred in April through September with June having the greatest number. Viral cases, primarily channel catfish virus, were diagnosed from June through September. Bacterial organisms were diagnosed in 27 percent of the cases and were most prevalent from April through September. /Aeromonas hydrophila/ or

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/Flexibacter columnaris/ were involved in 82.2 percent of the bacterial cases. Parasitic cases were most prevalent in the spring and fall. Parasites were diagnosed in 25.2 percent of the cases. Of these, protozoa were involved in 59 percent with the dominant forms being /Ichthyophthirius/ and /Trichodina/.

77-001477 Wedemeyer, G. A.; Yasutake, W. T. CLINICAL METHODS FOR THE ASSESSMENT OF THE EFFECTS OF ENVIRONMENTAL STRESS ON FISH HEALTH. U.S. Fish Wildl. Serv. Tech. Pap. 89. 18p. 1977. SFA 22(3)
[U.S. FWS, Natl. Fish. Res. Lab., Bldg. 204, Naval Support Activity, Seattle, WA 98115] Clinical methods are presented for biological monitoring of hatchery and native fish populations to assess the effects of environmental stress on fish health. The choice of methods is based on the experience of the authors and the judgment of colleagues at fishery laboratories of the U.S. Fish and Wildlife Service. Detailed analysis methods, together with guidelines for sample collection and for the interpretation of results, are given for tests on blood (cell counts, chloride, cholesterol, clotting time, cortisol, glucose, hematocrit, hemoglobin, lactic acid, methemoglobin, osmolality, and total protein); water (ammonia and nitrite content); and liver and muscle (glycogen content).

BACTERIAL DISEASES

77-001478 Anonymous TRANSLATIONS OF EARLY POLISH LANGUAGE REPORTS ON BACTERIAL HEMORRHAGIC SEPTICEMIA. Prog. Fish-Cult. 39 (2): 93. Apr. 1977. SFA 22(3)

77-001479 Antipa, P.; Amend, D. F. IMMUNIZATION OF PACIFIC SALMON: COMPARISON OF INTRAPERITONEAL INJECTION AND HYPEROSMOTIC INFILTRATION OF /VIBRIO ANGUILLARUM/ AND /AEROMONAS SALMONICIDA/ BACTERINS. J. Fish. Res. Board Can. 34 (2): 203-208. Feb. 1977. In English with French summ. SFA 22(3)
[TAVOLEK, Inc., Redmond, WA 98052]

77-001480 Antipa, P. G. FIELD TRIALS OF INTRAPERITONEALLY INJECTED AND INFILTRATED /VIBRIO ANGUILLARUM/ AND /AEROMONAS SALMONICIDA/ VACCINES IN PEN-REARED PACIFIC SALMON. Ph.D. dissertation, Univ. Wash. 110 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

Intraperitoneal injections of three types of /Vibrio anguillarum/ bacterin (heat-killed, formalin-killed, and a combination of heat and formalin-killed) were tested in chinook salmon and coho salmon to assess the feasibility of preventing vibriosis by immunization in commercial aquaculture. A single injection of /V. anguillarum/ bacterin gave substantial protection to chinook salmon for 6 months post-inoculation (32 percent mean mortality in all injected groups) in comparison to a control group (85 percent mortality). Both species of salmon showed the highest survival when treated with the heat-killed /V. anguillarum/ bacterin. Serum antibody titer of /V. anguillarum/ agglutinins was increased by intraperitoneal injection. No relationship was found between mean hematocrit levels and subsequent mortality. /V. anguillarum/ was the pathogen most frequently isolated from moribund chinook salmon, while /Aeromonas salmonicida/ was the predominant organism isolated from moribund coho salmon in the first phase of these experiments. The second phase of experiments consisted of comparative field testing of intraperitoneal injection and

SPORT FISHERY ABSTRACTS

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infiltration, a new technique of fish immunization, for control of vibriosis and furunculosis in pen-reared coho and chinook salmon. Both methods provided significant protection against vibriosis, but infiltration provided the best protection and fastest rise in antibody titer of the seven treatments tested in coho salmon. A lack of natural */A. salmonicida/* challenge prevented assessment of the efficacy of the furunculosis vaccines. Infiltration of */V. anguillarum/* and */A. salmonicida/* bacterins in chinook salmon resulted in four times greater survival than the control group.--From abstr.

77-001481 Bullock, G. L. VIBRIOSIS IN FISH. U.S. Fish Wildl. Serv. Fish Dis. Leaflet. 50. 11p. Apr. 1977. SFA 22(3)

[U.S. FWS, East. Fish Dis. Lab., Kearneysville, WV 25430]

77-001482 Egidius, E.; Andersen, K. NORWEGIAN REFERENCE STRAINS OF */VIBRIO ANGUILLARUM/*. *Aquaculture* 10 (3): 215-219. Mar. 1977. SFA 22(3)

[Inst. Mar. Res., Dir. Fish., 5011 Bergen-Nordnes, Norway] Strains of */Vibrio anguillarum/* isolated from rainbow trout (*/Salmo gairdneri/*) and saithe (*/Gadus virens/*) have been studied and compared, and strains to be used for further investigations are described.

77-001483 Gill de Rodriguez, C. T.; Bastardo, J. W. INVESTIGACION DE ENTEROBACTERIAS EN EL CONTENIDO GASTROINTESTINAL DE COCOCORO, */ORTHOPRISTIS RUBER (PISCES: PERCIFORMES, POMADASYDAE)*. INVESTIGATION OF ENTEROBACTERIA IN THE GASTROINTESTINAL CONTENTS OF COCOCORO, */ORTHOPRISTIS RUBER/ (PISCES: PERCIFORMES, POMADASYDAE)*. Bol. Inst. Oceanogr. Univ. Oriente Cumana 14 (2): 149-156. Dec. 1975. In Spanish with English summ. SFA 22(3)

[Dep. Biol., Univ. Oriente, Cumana, Venezuela]

77-001484 Kimura, T.; Awakura, T. BACTERIAL KIDNEY DISEASE OF SALMONID: FIRST OBSERVATION IN JAPAN. Bull. Jpn. Soc. Sci. Fish. 43 (2): 143-150. Feb. 1977. In Japanese with English summ. SFA 22(3)

[Lab. Microbiol., Fac. Fish., Hokkaido Univ., Hokodate, Japan] A severe epidemic disease occurred among the juveniles of chinook salmon (*/Oncorhynchus tshawytscha/*), kokanee salmon (*/O. nerka/*), pink salmon (*/O. gorbuscha/*), and masu salmon (*/O. masou/*) in the Hokkaido Fish Hatchery and the Hokkaido Salmon Hatchery during the years 1973-1974. From symptomatological, microbiological, serological, histopathological, and hematological studies of the disease, it was diagnosed as "bacterial kidney disease". This is the first completely documented occurrence of bacterial kidney disease in Japan.

77-001485 Kusuda, R.; Itami, T.; Muneakiyo, M.; Nakajima, H. CHARACTERISTICS OF A */EDWARDSIELLA/* SP. FROM AN EPIZOOTIC OF CULTURED CRIMSON SEA BREAMS. Bull. Jpn. Soc. Sci. Fish. 43 (2): 129-134. Feb. 1977. In Japanese with English summ. SFA 22(3)

[Dep. Cult. Fish., Fac. Agric., Kochi Univ., Nangoku, Kochi Pref., Japan] From late summer to early winter in 1974, an epizootic occurred among cultured crimson sea breams, */Erynnis japonicus/*, in Mie Prefecture. The disease was characterized by the presence of numerous bacterial colonies as greyish white spots in the spleen and the kidney. Generally, hemorrhagic ulcers appeared on the head, especially in the opercular region, and body surface. The causative organisms isolated from the kidney were Gram-negative rods. On BHI agar colonies developed within 24 hours at 25°C. The organisms were

77-001485 CONTINUED

nonmotile. IMViC reactions were (4+--). Hydrogen sulfide was produced abundantly from TSI agar. The organisms lacked phenylalanine deaminase and urease. Gelatin was not liquefied. Lysine and ornithine decarboxylases were present. Alginate was not utilized. Acid and gas were produced in glucose, fructose, mannose, galactose, maltose, mannitol; acid from arabinose and sorbitol were produced later. Other carbohydrates were not utilized. In Kauffmann-Peterson's broth, The organisms formed weak acids from citrate and /d/-tartrate. They grew in KCN broth. Catalase positive and oxidase negative. On the basis of the above characteristics, the organisms were identified as a variant of /Edwardsiella tarda/.

77-001486 Minchew, C. D.; Varbrough, J. D. THE OCCURRENCE OF FIN ROT IN MULLET (/MUGIL CEPHALUS/) ASSOCIATED WITH CRUDE OIL CONTAMINATION OF AN ESTUARINE POND-ECOSYSTEM. J. Fish Biol. 10 (4): 319-323. Apr. 1977. SFA 22(3)

[Dep. Zool., Miss. State Univ., Mississippi State 39762] Four estuarine pond-Ecosystems equipped with tidal simulation were established and stocked with mullet, shrimp, and oysters. A 6 month pre-spill sampling period established a consistently low incidence of disease in the mullet, /Mugil cephalus/, from all ponds. Following the preliminary study period, Empire Mix crude oil (4.0-5.0 p.p.m.) was spilled on each of two of the ponds in mid-July, 1974. Six to eight days following the oil spill all the mullet examined from the treated ponds had varying degrees of fin rot on one or more of their fins. The fin erosion involved primarily the caudal, Pectoral, and pelvic fins with the caudal fin the most severely damaged. The degree of damage to the fins varied from a slight discoloration with no visible fraying to complete erosion of all of the fin elements. A gram negative rod tentatively identified as /Vibrio/ sp. is considered the primary pathogen responsible for the fin erosion. Although the condition of the infected fish indicated the possibility of a systemic infection, only a low Percentage of the kidney cultures taken from the diseased fish were positive indicating the infection was mostly external. The course of the infection was documented over a 56-day period following the oil spill. Significantly, 96 percent of the mullet observed from the treated ponds had some degree of fin damage while only 6 percent of those observed from the control ponds had eroded fins. The high incidence of fin rot which occurred in the estuarine-pond ecosystems did not occur during numerous acute exposures of mullet to crude oil in the laboratory.

77-001487 Murchelano, P. A.; Ziskowski, J. HISTOPATHOLOGY OF AN ACUTE FIN LESION IN THE SUMMER FLOUNDER, /PARALICHTHYS DENTATUS/, AND SOME SPECULATIONS ON THE ETIOLOGY OF FIN ROT DISEASE IN THE NEW YORK BIGHT. J. Wildl. Dis. 13 (1): 103-106. Jan. 1977. SFA 22(3)

[NMFS, Middle Atl. Coast. Fish. Cent., Oxford, MD 21654] The histopathology of acute fin rot disease in summer flounder, /Paralichthys dentatus/, from the New York Bight is described. Grossly, caudal and dorsal fin lesions appeared ragged or frayed with no evidence of resolution. Microscopically, there was epidermal and dermal necrosis, congestion, edema, focal and diffuse hemorrhage, and Zenkers necrosis of underlying muscle. Gram-negative bacteria were present in the fin tissues as well as in heart muscle and liver parenchyma. The inflammatory response consisted mostly of macrophages. The significance of the acute disease in summer flounder is discussed in relation to the etiology of fin rot disease in winter flounder from the Bight.

77-001488 Rodsaether, M. C.; Olafsen, J.; Raa, J.; Myhre, K.; Steen, J. B. COPPER AS AN INITIATING FACTOR OF VIBRIOSIS (/VIBRIO ANGUILLARUM/) IN EEL (/ANGUILLA ANGUILLA). J. Fish Biol. 10 (1): 17-21. Jan. 1977. SFA 22(3)

[Inst. Biol. Geol., Univ. Tromsø, 9000 Tromsø, Norway] Eels (/Anguilla anguilla/) which were exposed to copper-contaminated fresh water (30-60 ug Cu/l) died with signs of vibriosis (/Vibrio anguillarum/). Eels kept in non-contaminated fresh water (less than 6 ug Cu/l) remained healthy. /V. anguillarum/ was shown to be present in the eels with symptoms of vibriosis. We suggest /V. anguillarum/ is a common inhabitant of eels and copper can change a commensal association between fish and bacterium to one of pathogenicity.

77-001489 Schachte, J. H., Jr. STUDIES ON THE IMMUNIZATION OF THE CHANNEL CATFISH AGAINST TWO BACTERIAL PATHOGENS. Ph.D. dissertation, Auburn Univ. 101 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

Channel catfish were immunized against /Aeromonas hydrophila/ and /Flexibacter columnaris/ with a heat inactivated polyvalent bacterin using three routes of administration. The fish were challenged by natural infection under cage culture conditions in a pond at the Fisheries Research Unit at Auburn University. Protective immunity determined by survival of control versus immunized fish revealed no significant differences ($P \geq .05$) between oral, injection or immersion vaccinated fish and controls or among the different routes. Non-significant differences were attributed to experimental variation and lack of treatment effect due to competitive inhibition. Fish immunized in aquaria with a complete /A. hydrophila/ bacterin had titers greater by a factor of 16 against /A. hydrophila/ than fish injected with a polyvalent combination or untreated controls. Partial characterization of immunoglobulins from immune fish by analytical ultracentrifugation and electrophoresis on cellulose acetate and in polyacrylamide gels before and after absorption with a homologous antigen was conducted. A shift from 13S to 7S antibody in immune sera was found at 30 days and 120 days post-immunization, respectively. Electrophoretograms of immune sera and gut extracts and their duplicate absorbed samples showed the majority of antibody activity in the catfish to be located in the region of beta mobility.

77-001490 Skoge Johnsen, G. IMMUNOLOGICAL STUDIES ON /VIBRIO ANGUILLARUM/. Aquaculture 10 (3): 221-230. Mar. 1977. SFA 22(3)

[Inst. Gen. Microbiol., Univ. Bergen, Allegaten 70, N-5000 Bergen, Norway] Nineteen strains of /Vibrio anguillarum/ were examined by means of several immunological methods. Nine other strains belonging to the genera /Vibrio/, /Aeromonas/ and /Pseudomonas/ were also examined for comparison. Lipopolysaccharides were prepared from seven of the /V. anguillarum/ strains. The lipopolysaccharides seem to be species-specific for /V. anguillarum/, not being detected in any of the other strains examined. Common antigens are also found in /V. anguillarum/ and other species of marine bacteria. The strains of /V. anguillarum/ fall into three different serological groups according to the type of lipopolysaccharide in the cell wall. One of the groups comprises only one strain, this strain being the only one not isolated from diseased fish. The lipopolysaccharides were used in an indirect haemagglutination test. Inhibition of this haemagglutination with tissue extracts from diseased fish can be used for practical purposes in the diagnosis of vibriosis.

77-001491 Udey, L. P.; Young, P.; Sallman, R. ISOLATION AND CHARACTERIZATION OF AN ANAEROBIC BACTERIUM, /EUBACTERIUM TAPANTFELIUS/ SP. NOV., ASSOCIATED WITH STRIPED MULLET (/MUGIL CEPHALUS/) MORTALITY IN BISCAYNE BAY, FLORIDA. J. Fish. Res. Board Can. 34 (3): 402-409. Mar. 1977. In English with French summ. SFA 22(3)
[Dep. Microbiol., Univ. Miami Sch. Med., Miami, FL 33152]

77-001492 Wedemeyer, G. A.; Nelson, N. C. SURVIVAL OF TWO BACTERIAL FISH PATHOGENS (/AEROMONAS SALMONICIDA/ AND THE ENTERIC PREDMOUTH BACTERIUM) IN OZONATED, CHLORINATED, AND UNTREATED WATERS. J. Fish. Res. Board Can. 34 (3): 429-432. Mar. 1977. In English with French summ. SFA 22(3)

[U.S. FWS, West. Fish Dis. Lab., Naval Support Activity, Seattle, WA 98115]

FUNGAL DISEASES

77-001493 Neish, G. A. OBSERVATIONS ON SAPROLEGNIASIS OF ADULT SOCKEYE SALMON, /ONCORHYNCHUS NEBKA/ (WALBAUM). J. Fish Biol. 10 (5): 513-522. May 1977. SFA 22(3)

[Dep. Bot., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada] Some observations on the mycology and pathology of saprolegniasis of maturing sockeye salmon are reported. /Saprolegnia/ spp. were isolated from all lesions examined. Some isolates did not produce oogonia and could not be identified further. The other isolates have affinities to the /S. diclina/-/S. parasitica/ complex. Observations on the gross and histo-pathology of the lesions show the fungi can be active pathogens. It is hypothesized that increased levels of plasma corticosteroids and depletion of ascorbic acid reserves in the fish increase the probability that /Saprolegnia/ spp. will initiate infections, either alone or concurrently with other opportunistic parasites.

77-001494 Oseid, D. M. CONTROL OF FUNGUS GROWTH ON FISH EGGS BY /ASELLUS MILITARIS/ AND /GAMMAPUS PSEUDOMIMNAPUS/. Trans. Am. Fish. Soc. 106 (2): 192-195. Mar. 1977. SFA 22(3)

[Dep. Entomol. Fish. Wildl., Univ. Minn., St. Paul 55108]

77-001495 Peduzzi, P.; Nolard-Tintigner, N.; Bizzozero, S. RECHERCHES SUR LA SAPROLEGNIOSE. II. ETUDE DU PROCESSUS DE PENETRATION, MIS EN EVIDENCE D'UNE ENZYME PROTEOLYTIQUE ET ASPECT HISTOPATHOLOGIQUE. [RESEARCH ON /SAPROLEGNIA/. II. STUDY OF THE PROCESS OF PENETRATION, WITH EVIDENCE OF A PROTEOLYTIC ENZYME AND HISTOPATHOLOGIC ASPECTS.] Riv. It. Piscic. Ittiop. 11 (4): 109-117. Oct.-Nov.-Dec. 1976. In French with English and Italian summ. SFA 22(3)

[FAWAG, 8600 Dubendorf-Zurich, ETH, Zurich, Switzerland] By injection into rabbit of antigenic extracts of potentially parasitic /Saprolegnia/ species, immune sera were obtained which allowed application of two serological techniques: the double gel diffusion analysis and the immunoelectrophoresis. A considerable chymotrypsin-like enzymatic activity was detected on the immunochemical diagrams obtained from both techniques by means of a specific chromogenic reaction. Enzyme activity was detected and measured in samples of both culture media and cellular extracts. The antigenic properties of the enzyme released into growth medium are the same; but the activity is two to five times higher in the growth medium extract compared to the

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cellular extracts. The large quantity found in the culture medium suggests that this enzyme could be physiologically destined for an extracellular function. Its proteolytic activity could play an important role in the digestion mechanism necessary to the hyphae penetration into the host tissues. The histopathological investigations of fish infected by saprolegniosis seems to confirm this interpretation in that deep penetration of hyphae could be detected. The fish exhibit an immune response against fungic antigens by inoculation of extracts as well as by spontaneous saprolegniosis. The importance of a proteolytic enzyme for this form of mycosis is discussed in connection with the host-parasite relationships. In conclusion we believe that this extracellular enzyme is of importance from the point of view of the parasitic adaptability of the microorganism investigated, since the possibility of evolution from saprophitism to biotrophism is evaluated in relation to the presence and quantity of hydrolases secreted into the host tissues.--From abstr.

PROTOZOAN DISEASES

77-001496 Duncan, B. L. URCPOLAPIID CILIATES, INCLUDING THREE NEW SPECIES, FROM CULTURED PHILIPPINE FISHES. Trans. Am. Microsc. Soc. 96 (1): 76-81. Jan. 1977. SFA 22(3)

[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830] /Trichodina heterodontata/ n. sp. from /Tilapia zillii/, /T. mossambica/, and /Trichogaster trichopterus/; /Trichodinella carpi/ n. sp. from /Cyprinus carpio/; and /Trichodinella tilapiae/ n. sp. from /T. zillii/ are described. /Trichodina acuta/ Lom, 1961 is redescribed from /T. zillii/ and /T. mossambica/, new host and locality records.

77-001497 Hoffman, G. L.; O'Grodnick, J. J. CONTROL OF WHIRLING DISEASE (/MYXOSOMA CEREBRALIS/): EFFECTS OF DRYING, AND DISINFECTION WITH HYDRATED LIME OR CHLORINE. J. Fish Biol. 10 (2): 175-179. Feb. 1977. SFA 22(3)

[U.S. FWS, Fish Farm. Exp. Stn., P.O. Box 860, Stuttgart, AR 72160] Thorough air drying of contaminated mud killed the spores of /Myxosoma cerebralis/. Treatment of simulated earthen ponds with hydrated lime with up to 4550 g/m² on the wet mud did not kill all of the spores. Treatment of simulated earthen ponds with up to 1200 p.p.m. chlorine did not kill all of the spores, however, treatment of contaminated water with 10 p.p.m. chlorine did kill the spores.

77-001498 Hoffman, G. L.; Markiw, M. E. CONTROL OF WHIRLING DISEASE (/MYXOSOMA CEREBRALIS/): USE OF METHYLENE BLUE STAINING AS A POSSIBLE INDICATOR OF EFFECT OF HEAT ON SPORES. J. Fish Biol. 10 (2): 181-183. Feb. 1977. SFA 22(3)

[U.S. FWS, Fish Farm. Exp. Stn., P.O. box 860, Stuttgart, AR 72160] Methylene blue staining (0.08 percent) was used to determine efficiency of heat treatment in killing spores of /Myxosoma cerebralis/. Nearly all spores heated at 90°C for 10 min and 70°C for 100 min became stained giving presumptive evidence that they were killed.

77-001499 Hoffman, G. L.; Landolt, M.; Camper, J. E.; Coats, D. W.; Stookey, J. L.; Burek, J. D. A DISEASE OF FRESHWATER FISHES CAUSED BY /TETRAHYMENA CORLISSI/ THOMPSON, 1955, AND A KEY FOR IDENTIFICATION OF POLOTRICH CILIATES OF FRESHWATER FISHES. J. Parasitol. 61 (2): 217-223. Apr. 1975. SFA 22(3)

[U.S. FWS, Fish Farming Exp. Stn., Stuttgart, AR] /Tetrahymena corlissi/, a free-living protozoan, apparently caused the death of large numbers of guppies (/Poecilia reticulatus/) and occasionally other fishes, in aquaria and hatcheries at several locations. Apparently the disease occurs when the fish and protozoan populations are both at a high level of density. The signs include white spots and epidermal damage. Histologically, /T. corlissi/ could be seen in skin, muscle, and viscera; in some there was marked inflammation, in others there was little tissue reaction. A key is presented for the identification of invasive fish ciliates: /Chilodonella/, /Hemiophrys/, /Ichthyophthirius/, /Ophryotrocha/, and /Tetrahymena/.

77-001500 Moser, M.; Love, M. S. /PENNEGUYA SEBASTA/ SP. N. (PROTOZOA, MYXOSPORIDIA) FROM CALIFORNIA ROCKFISH, /SEBASTES/ SPP. J. Parasitol. 61 (3): 481-483. June 1975. SFA 22(3)

[Dep. Biol. Sci., Univ. Calif., Santa Barbara 93106] /Penneguya sebasta/ sp. n. was found on the bulbous and truncus arteriosus and in the heart chambers of 7 species of marine rockfish, /Sebastes/, from central and southern California. The incidence of this parasite may be of economic interest to the sport and commercial fisheries because of its possible pathogenicity.

77-001501 Moser, M.; Noble, E. P. THE MYXOSPORIDIAN GENUS /DAVISIA/ IN TWO DEEP-SEA FISHES. J. Parasitol. 61 (4): 641-694. Aug. 1975. SFA 22(3)

[Dep. Biol. Sci., Univ. Calif., Santa Barbara 93106] Two new species of /Davisia/ were identified in the urinary bladders and kidney tubules of 2 species of marine fish. /D. anoplopoma/ was found in /Anoplopoma fimbria/ from southern and central California. /D. pectoralis/ was recorded from /Coryphaenoides pectoralis/ from northern California. We have distinguished between /Davisia/ species whose lateral appendages are "solid" and those which contain a cavity in their lateral appendages. Our species belong to the latter category. We believe the lateral appendages of "hollow" species are extensions of the spore body and not, as sometimes pictured, independently attached.

77-001502 Newman, M. W. CUTANEOUS MYXOSPORIDIOSIS/ IN AN AMERICAN EEL, /ANGUILLA ROSTRATA/. Chesapeake Sci. 18 (2): 240-242. June 1977. SFA 22(3)

[NMFS, Middle Atl. Coast. Fish. Cent., Oxford Lab., Oxford, MD 21654]

77-001503 Stein, A. A. [PARASITIC CILIATES (PERITRICHIA, URCEOLARIIDAE) OF THE WHITE SEA.] Acta Protozool. 15 (4): 447-470. 31 Dec. 1976. In Russian with English summ. SFA 22(3)

[Inst. Cytol., Acad. Sci., Leningrad F-121, Prospekt Maklina 32, USSR] In the smears taken from 24 species of fishes the presence of 12 ciliate species was ascertained: /Trichodina cottidarum/ Dogiel, 1948; /T. murmanica/ Poljansky, 1955; /T. elegini/ Schulman-Albova, 1950; /T. galyae/ Lom et Laird, 1969; /T. puvtoraci marisalbi/ G. Stein subsp. n.; /Trichodina/ sp. 1 (on the gills of /Platessa platessa/); /T. domerguei/ subsp. /Domerguei/ Haider, 1964; /T. tenuidens/ Faure-Fremiet, 1943; /Trichodina/ sp. 2 (from the urinary

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77-001503 CONTINUED

bladder of (*Coregonus albula*). The revision of the fauna of Urceolariidae of fishes of the White Sea made on the basis of the standard silver impregnation method.

77-001504 Taylor, P. W. ISOLATION AND EXPERIMENTAL INFECTION OF FREE-LIVING AMEBAE IN FRESHWATER FISHES. J. Parasitol. 63 (2): 232-237. Apr. 1977. SFA 22(3)

[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830]

VIRAL DISEASES

77-001505 Alpers, C. W.; McCain, B. B.; Myers, M. S.; Wellings, S. R. LYMPHOCYSTIS DISEASE IN YELLOWFIN SOLE (*LIMANDA ASPERPA*) IN THE BERING SEA. J. Fish. Res. Board Can. 34 (5): 611-616. May 1977. In English with French summ. SFA 22(3)

[S. R. Wellings: Dep. Pathol., Sch. Med., Univ. Calif., Davis 95616]

77-001506 Banowetz, G. M.; Fryer, J. L.; Iwai, P. J.; Martignoni, M. F. EFFECTS OF THE DOUGLAS-FIR TUSSOCK MOTH NUCLEOPOLYHEDROSIS VIRUS (*BACULOVIRUS*) ON THREE SPECIES OF SALMONID FISH. U.S. Dep. Agric. For. Serv. Res. Rep. PNW-214. 6p. 1976. Available from Pac. Northwest Forest Range Exp. Stn., USDA, Portland, OR. SFA 22(3)

Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), and steelhead trout (*Salmo gairdneri*) showed no pathology when exposed to *Baculovirus* by three different routes. Cell lines derived from chinook salmon the steelhead trout were refractory to nonoccluded virions, and no cytopathology was observed by light and electron microscopy. Both polyhedra and nonoccluded virions were inactivated rapidly by coho salmon exposed to the virus by three different routes.

77-001507 de Kinkelin, P.; Le Berre, M. [ISOLATION OF A PATHOGENIC RHABDOVIRUS OF BROWN TROUT (*SALMO TRUTTA*).] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 284 (1): 101-104. Jan. 1977. In French with English summ. SFA 22(3)

[Inst. Natl. Rech. Agron. Lab. Ichthyopathol., 78850 Thiverval-Grignon, France] A Rhabdovirus pathogenic both for Rainbow and Brown Trout has been isolated from Brown Trout suffering heavy mortalities associated with muscular haemorrhages and necrotic lesions of kidney and spleen. According to seroneutralization tests and host range, this virus appears to be different from the other known salmonids rhabdoviruses. Upon the basis of its *in vitro* gross characteristics, it is identical to Viral Haemorrhagic Septicemia Virus (VHS), F(1) serotype, but differs from Infectious Hematopoietic Necrosis and VHS type II viruses.

77-001508 de Kinkelin, P.; Baudouy, A.-M.; Le Berre, M. REACTION DE LA TRUITE FARIO (*SALMO TRUTTA*, L. 1766) ET APC-EN-CIPL (*SALMO GAIRDNERI*/ RICHARDSON, 1836) A L'INFECTION PAR UN NOUVEAU PHABDOVIRUS. [RESPONSE OF BROWN TROUT AND RAINBOW TROUT TO INFECTION BY A NEW PHABDOVIRUS.] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 284 (5): 401-404. 31 Jan. 1977. In French with English summ. SFA 22(3)

Intra peritoneal injection of 200 μ Trout held at + 12°C with 2 x 10⁸ p. f. u. of a new Phabdovirus (strain 23.75) induces an interferon synthesis within 2 days. (IF titres reaching 2,000 units ml). 1 month

77-001508 CONTINUED

later, the surviving fish exhibit a specific anti 23.75 neutralizing serum activity (titre 40 to 80) which has been demonstrated to be due to immunoglobulins. This seroneutralization is also recorded in 1/3 of the survivors of natural infection.

77-001509 Macdonald, P. D.; Yamamoto, T. THE STRUCTURE OF INFECTIOUS PANCREATIC NECROSIS VIRUS RNA. J. Gen. Virol. 34 (2): 235-247. Feb. 1977. SFA 22(3)

[Dep. Microbiol., Univ. Alberta, Edmonton, AB T6G 2E9, Canada] The RNA from infectious pancreatic necrosis virus has been purified and had a sedimentation velocity of 14S on sucrose gradients, a buoyant density of 1.60 g/ml in Cs(2)SO(4) and pyrimidine to purine ratios near unity. The RNA had the appearance of a linear double stranded molecule with an average length of 0.92 um and a standard deviation of 0.07 um when observed under the electron microscope using the Kleinschmidt protein film technique. This would correspond to a mol. wt. of $2.4 \pm 0.2 \times 10^6$. The RNase A resistance of IPN virus RNA exhibited a marked salt dependence; it was 92 percent resistant in 0.1 M-NaCl, but only 9 percent resistant, or less, in 0.01 M-NaCl. The RNA was resistant to denaturation by boiling at NaCl concentrations of 0.04 M or higher, but did not denature at lower concentrations. Polyacrylamide gel electrophoresis of the RNA indicated that two RNA species were present and the standard deviation of lengths in the electron microscope indicated that they could not differ by more than 4×10^5 in mol. wt.

77-001510 Sherburne, S. W. OCCURRENCE OF DISCINE ERYTHROCYTIC NECROSIS (PEN) IN THE BLOOD OF THE ANADROMOUS ALEWIFE, /ALOSA PSEUDOHARENGUS/, FROM MAINE COASTAL STREAMS. J. Fish. Res. Board Can. 34 (2): 281-286. Feb. 1977. In English with French summ. SFA 22(3)

[Me. Dep. Mar. Resour., Fish. Res. Stn., West Boothbay Harbor 045751]

OTHER DISEASES AND PARASITES

77-001511 Aliff, J. V. DIGENETIC TREMATODES FROM KENTUCKY FISHES. Trans. Ky. Acad. Sci. 38 (1-2): 1-14. Mar. 1977. SFA 22(3)

[Dep. Biol., Ga. Coll., Milledgeville, GA 31061] In 1971-1972 and 1974, 3059 fishes, representing 91 species, were taken from major river drainages of Kentucky including the Big Sandy, Licking, Kentucky, Cumberland, Salt, Tennessee, and Green rivers. Twenty-three species of adult digenetic trematodes occurred in 16.5 percent or 538 host fishes representing 40 species.--From abstr.

77-001512 Aliff, J. V.; Smith, D.; Lucas, H. SOME METAZOAN PARASITES FROM FISHES OF MIDDLE GEORGIA. Trans. Am. Microsc. Soc. 96 (1): 145-148. Jan. 1977. SFA 22(3)

[Dep. Biol., Georgia Coll., Milledgeville 31061] In 1972-1975, 226 fishes, representing 23 host species, were taken from the middle Oconee River drainage (15 sites), the upper Ogeechee River drainage (4 sites), and the middle Ocmulgee River drainage (2 sites). Some 87 percent (197 specimens) of all fishes were parasitized. Parasites recovered, with some new host records, included species from the following groups: Acanthocephala, Crustacea-Copepoda, Cestoidea, Hirudinea, Nematoda, Trematoda-Digenea, and Trematoda-Monogenea.

77-001513 Amin, O. M. /ACANTHOCEPHALUS PARKSIDEI/ SP. N. (ACANTHOCEPHALA: ECHINORHYNCHIDAE) FROM WISCONSIN FISHES. J. Parasitol. 61 (2): 301-306. Apr. 1975. SFA 22(3)

[Sci. Div., Univ. Wis.-Parkside, Kenosha 531401 /Acanthocephalus parksidei/ sp. n. is described from over 4,000 specimens recovered from 11 fish hosts in the Pike River, southeastern Wisconsin. /A. parksidei/ is a highly variable acanthocephalan which appears to represent an intermediate form between the only 2 other members of the same genus, /A. dirus/ and /A. jacksoni/, described from North American freshwater fishes. It is structurally similar to the larger /A. dirus/ but is separated from it primarily by having fewer proboscis hook rows and hooks per row. It is separated from /A. jacksoni/ on the basis of its slender body form, relatively larger size of male reproductive system in proportion to body size, as well as other features. It differs from the larger European /A. lucii/ by having smaller proboscis hooks, different hook root shape, smaller proboscis receptacle, and smaller embryos.

77-001514 Amin, O. M. HOST AND SEASONAL ASSOCIATIONS OF /ACANTHOCEPHALUS PARKSIDEI/ AMIN, 1974 (ACANTHOCEPHALA: ECHINORHYNCHIDAE) IN WISCONSIN FISHES. J. Parasitol. 61 (2): 318-329. Apr. 1975. SFA 22(3)

[Sci. Div., Univ. Wis.-Parkside, Kenosha 531401 Ecological associations of /Acanthocephalus parksidei/ Amin, 1974, were studied in 11 southeastern Wisconsin fishes during 1972-73. Parasitic load was found to be related to host species, size (age), sex, concurrent infections, collection site, and season. Distribution in host intestine was related to the extent or intensity of infection, posterior migration, and concurrent infections. Parasitic cycle commenced in late summer-Early autumn, peaked (in frequency and maturation) during the spring, and terminated in the late summer.

77-001515 Amin, O. M.; Burrows, J. M. HOST AND SEASONAL ASSOCIATIONS OF /ECHINORHYNCHUS SALMONIS/ (ACANTHOCEPHALA: ECHINORHYNCHIDAE) IN LAKE MICHIGAN FISHES. J. Fish. Res. Board Can. 34 (3): 325-331. Mar. 1977. In English with French summ. SFA 22(3)

[Sci. Div., Univ. Wis.-Parkside, Kenosha 531401

77-001516 Amin, O. M. INTESINAL HELMINTHS OF SOME SOUTHEASTERN WISCONSIN FISHES. Proc. Helminthol. Soc. Wash. 42 (1): 43-46. Jan. 1975. SFA 22(3)

[Sci. Div., Univ. Wis.-Parkside, Kenosha 531401 Three hosts (the white sucker, /Catostomus commersoni/ (Lacepede); creek chub, /Semotilus atromaculatus/ (Mitchill), and green sunfish, /Lepomis cyanellus/ Raf.] from southeastern Wisconsin's Pike River were each infected with two or more of the following nine helminths: /Neoechinorhynchus/ sp. (Acanthocephala: Neoechinorhynchidae); /Pomphorhynchus bulbacolli/ (Linkins, 1919) Van Cleave, 1919 (Acanthocephala: Pomphorhynchidae); /Biacetabulum biloculoides/ Mackiewicz and McCrae, 1965, and /Glaridacris catostomi/ Cooper, 1920 (Cestoda: Caryophyllaeidae); /Bothriocephalus cuspidatus/ Cooper, 1917 (Cestoda: Bothriocephalidae), new host record in /L. cyanellus/; /Triclanodistomum attenuatum/ Mueller and Van Cleave, 1932 (Trematoda: Tisenchidae); metacercariae of /Ornithodiplostomum ptychocheilus/ (Faust, 1917), a new state record, and /Posthodiplostomum minimum/ (MacCallum, 1921) (Trematoda: Diplostomatidae); /Dorylaimus/ sp. (?) (Nematoda: Dorylaimidae).

77-001517 Amin, O. M. VARIABILITY IN /ACANTHOCEPHALUS PARKSIDEI/ AMIN, 1974 (ACANTHOCEPHALA: ECHINORHYNCHIDAE). J. Parasitol. 61 (2): 307-317. Apr. 1975. SFA 22(3)

[Sci. Div., Univ. Wis.-Parkside, Kenosha 53140] /Acanthocephalus parksidei/ Amin, 1974, was recently described from 11 species of Wisconsin fishes. Considerable variation was observed in this Acanthocephalan's body size, number and arrangement of proboscis hooks, size of hooks, proboscis, proboscis receptacle, lemnisci, embryos, testes, and cement glands, and number of the latter two. Most of these variations were related to worm sex and age as well as host species. Structural variations in the shape and lobation of lemnisci, abnormalities in hooks and body wall, and changes associated with monorchidism in males were noted. The significance of the erection of this new taxon in relation to the taxonomic criteria applied to acanthocephalan species is discussed.

77-001518 Bashirullah, A. K. M. RECORDS OF /LERNAEOLOPHUS/ SP. (COPEPODA) IN THE FISH /LUTJANUS GRISEUS/ (LINN.) WITH MULTIPLE EPIZOIC ORGANISMS ON THE COPEPOD. Bol. Inst. Oceanogr. Univ. Oriente Cumana 14 (2): 247-250. Dec. 1975. In English with Spanish summ. SFA 22(3)

[Inst. Oceanogr., Univ. Oriente, Cumana, Venezuela] Fifty four of 263 /Lutjanus griseus/ (Linn.) examined from the Cubaqua Island, Venezuela were infested with /Lernaeolophus/ sp. /Lernaeolophus/ sp. reported herein closely resembles /L. recurvus/ Wilson, 1913, and represents a new geographical distribution record. Three of 185 /Lernaeolophus/ collected had also epizoid organisms on them. The occurrence of the hivalves /Pteria colymbus/, /Pectenella lateralis/, /Pinctada/ sp., /Crassostrea rhizophorae/ and /Ostrea/, and a cirripede /Balanus trigonus/ upon /Lernaeolophus/ are all new records.

77-001519 Boxshall, G. A. THE HISTOPATHOLOGY OF INFECTION BY /LEPEOPHTHEIRUS PECTORALIS/ (MULLER) (COPEPODA: CALIGIDAE). J. Fish Biol. 10 (4): 411-415. Apr. 1977. SFA 22(3)

[Dep. Zool., Brit. Mus. (Nat. Hist.), Cromwell Rd., London SW7 5BD, England] The histology of the pectoral fin of the flounder, /Platichthys flesus/ (L.), is described and the presence of eosinophilic granule cells in the epidermis was noted. The histopathological effects of infection by /L. pectoralis/ result from the attachment and feeding activity of the parasite. Although the damage inflicted by /L. pectoralis/ is usually confined to the epidermis the lesions caused by sessile life cycle stages, adult females and chalimus larvae, often extend into the dermis. In the dermis the inflammatory response comprised fibroplasia and cellular infiltration which resulted in the formation of a dense fibrous granulation tissue.

77-001520 Bray, R. A.; Gibson, D. I. THE ACCACOELEIIDAE (DIGenea) OF FISHES FROM THE NORTH-EAST ATLANTIC. Bull. Brit. Mus. (Nat. Hist.) Zool. 31 (2): 53-99. 1977. SFA 22(3)

[Dep. Zool., Brit. Mus. (Nat. Hist.), Cromwell Rd., London SW7 5BD, England]



77-001521 Brooks, D. R.; Mayes, M. A. /PHYLLODISTOMUM SCRIPPSI/ SP. N. (DIGenea: GORGODEPIDAE) AND /NEOBENEDENIA GIRELLAE/ (HARGIS, 1955) YAMAGUTI, 1963 (MONogenea: CAPSALIDAE) FROM THE CALIFORNIA SHEEPHEAD, /PIMELOMETOPON PULCHRUM/ (AYRES) (PISCES: LABRIDAE). J. Parasitol. 61 (3): 407-408. June 1975. SFA 22(3)

[Gulf Coast Res. Lab., Ocean Springs, MS 39564] /Phyllodistomum scrippsi/ sp. n. is described from the urinary bladder and /Neobenedenia girellae/ is reported from the skin of /Pimelometopon pulchrum/ from La Jolla, California. /Phyllodistomum scrippsi/ differs from /P. horisbychowskyi/ in possessing lobed vitellaria, fewer extracecal uterine loops, irregular to lobed gonads, and larger eggs; and from /P. acceptum/ in possessing a short esophagus, nondigitiform vitelline lobes, and an oral sucker larger than the acetabulum. An annotated checklist of trematodes parasitizing /P. pulchrum/ is given.

77-001522 Brooks, D. R. A NEW GENUS AND TWO NEW SPECIES OF TREMATODES FROM CHARACID FISHES IN COLOMBIA. Trans. Am. Microsc. Soc. 96 (2): 267-270. Apr. 1977. SFA 22(3)

[Gulf Coast Res. Lab., Parasitol. Sect., Ocean Springs, MS 39564] Two new digeneans are described from characid fishes in Colombia. /Phyllodistomoides duncani/ n. g., n. sp. is proposed for a worm from /Astyanax/ sp. which differs from members of the nearby genus /Phyllodistomum/ in possessing a pharynx. /Chalcinotrema lucieni/ n. sp., from /Leporinus murrayorum/, differs from the other species of its genus by having oculate miracidia, a prepharynx shorter than the esophagus, and an oral sucker smaller than the acetabulum. A key to the four species of /Chalcinotrema/ is included.

77-001523 Brooks, D. R. SIX NEW SPECIES OF TETRAPHYLLIDEAN CESTODES, INCLUDING A NEW GENUS, FROM A MARINE STINGRAY /HIMANTURA SCHMARDAE/ (WERNER, 1904) FROM COLOMBIA. Proc. Helminthol. Soc. Wash. 44 (1): 51-62. Jan. 1977. SFA 22(3)

[Parasitol. Sect., Gulf Coast Res. Lab., Ocean Springs, MS 39564]

77-001524 Bureson, F. M. A NEW MARINE LEECH /AUSTRORDELLA CALIFORNIANA/ N. SP. (HIRUDINEA: PISCICOLIDAE) FROM SOUTHERN CALIFORNIA PLATFISHES. Trans. Am. Microsc. Soc. 96 (2): 263-267. Apr. 1977. SFA 22(3)

[Va. Inst. Mar. Sci., Gloucester Point 230721] /Austrobdella californiana/ n. sp., collected primarily from flatfishes (/Hippoglossina stomata/, /Pleuronichthys verticalis/, and /Pleuronichthys decurrens/) from coastal waters of southern California, is described. Individuals reach a maximum length of 35 mm. Pigmentation in life is uniformly green, often with narrow, paired, longitudinal, unpigmented stripes on the dorsal surface.

77-001525 Bureson, F. M. TWO NEW SPECIES OF /MALMIANA/ (HIRUDINEA: PISCICOLIDAE) FROM OREGON COASTAL WATERS. J. Parasitol. 63 (1): 130-136. Feb. 1977. SFA 22(3)

[Normandeau Assoc., Inc., Nashua Rd., Bedford, NH 031021] /Malmiana virida/ sp. n., parasitic on buffalo sculpins, /Euphrys bison/, in Yaquina Bay estuary, and /Malmiana diminuta/ sp. n., a parasite of rockfishes, /Sebastes/ spp., and cabezon, /Scorpaenichthys marmoratus/, are described. /Malmiana virida/ reaches a length of 30 mm and resembles /Malmiana scorpii/ (Malm) except in structure of the male reproductive system. /Malmiana diminuta/ attains a length of only 15 mm and is usually reddish-brown with marginal, metameric clusters of yellow pigment granules. Cocoons of /M. virida/ contain from 2 to 4 eggs, but those of /M. diminuta/ contain only 1 egg.

77-001526 Campbell, P. A. /ABYSSOTREMA PRITCHARDAE/ GEN. ET SP. N. (DIGENEA: PEILODISTOMIDAE) FROM THE DEEP-SEA FISH, /ALEPOCEPHALUS AGASSIZI/ GOODE AND BEAN 1883. J. Parasitol. 61 (4): 661-664. Aug. 1975. SFA 22(3)

[Dep. Biol., Southeast. Mass. Univ., North Dartmouth 027471 /Abyssotrema pritchardae/ gen. et sp. n. is described from the benthic teleost, /Alepocephalus agassizi/ Goode and Bean 1883 (Alepocephalidae), taken from Hudson Canyon in the western North Atlantic. The new genus is placed in the subfamily Monascinae Dolfus 1947 and relationships among /Abyssotrema/, /Flopsium/ Fischthal and Thomas 1972, and /Monascus/ Looss 1907 are discussed.

77-001527 Campbell, P. A. /DEGENERIA HALOSAURI/ (REVI 1887) GEN. ET COMB. N. (DIGENEA: GORGODERIDAE) FROM THE DEEP-SEA TELEOST /HALOSAURUS MACROCHIR/. J. Parasitol. 63 (1): 76-79. Feb. 1977. SFA 22(3)

[Dep. Biol., Southeast. Mass. Univ., North Dartmouth 027471 The earliest reported trematode from a deep-sea fish, /Distomon halosauri/ Bell 1887 collected by the F.M.S. /Challenger/ expedition, is redescribed from fresh material taken from the type host in the northwest Atlantic. The species is assigned to /Degeneria/ gen. et comb. n. Distinguishing characteristics are the combination of a pharynx, cirrus pouch with internal seminal vesicle, disposition of the uterus into the forebody, large eggs, and location in the excretory system of the host. The relationship of /Degeneria/ to other gorgoderids is discussed.

77-001528 Campbell, P. A. /HUDSONIA AGASSIZI/ GEN. ET SP. N. (ZOOCONIDA: HUDSONIINAE SUBF. N.) FROM A DEEP-SEA FISH IN THE WESTERN NORTH ATLANTIC. J. Parasitol. 61 (3): 409-412. June 1975. SFA 22(3)

[Dep. Biol., Southeast. Mass. Univ., North Dartmouth 027471 An unusual, zoogonid trematode, /Hudsonia agassizi/ gen. et sp. n., is described from the intestine of the deep-sea fish /Alepocephalus agassizi/ Goode and Bean 1883 (Alepocephalidae). Distinguishing characteristics of the genus are a very elongate genital atrium, an almost entirely pretesticular uterus, and the presence of large, protrusible, glandular papillae in the acetabulum. A new subfamily, Hudsoniinae, is proposed for the new genus.

77-001529 Campbell, P. A. A NEW FAMILY OF PSEUDOPHYLLIDAEAN CESTODES FROM THE DEEP-SEA TELEOST /ACANTHOCHAENUS IUTKENII/ GILI 1884. J. Parasitol. 63 (2): 301-305. Apr. 1977. SFA 22(3)

[Dep. Biol., Southeast. Mass. Univ., North Dartmouth, MA 027471

77-001530 Campbell, P. A.; Munroe, T. A. NEW HEMIURID TREMATODES FROM DEEP-SEA BENTHIC FISHES IN THE WESTERN NORTH ATLANTIC. J. Parasitol. 63 (2): 285-294. Apr. 1977. SFA 22(3)

[Dep. Biol., Southeast. Mass. Univ., North Dartmouth 027471

77-001531 Campbell, R. A. TETRAPHYLLIDEAN CESTODES FROM WESTERN NORTH ATLANTIC SELACHIANS WITH DESCRIPTIONS OF TWO NEW SPECIES. J. Parasitol. 61 (2): 265-270. Apr. 1975. SFA 22(3)

[Dep. Biol., Southeast Mass. Univ., North Dartmouth 027471
/Rhinobothrium corymbum/ sp. n. is described from /Dasystis americana/ Hildebrand and Schroeder. /Pha'dotobothrium anterophallum/ sp. n. is reported from /Mobula hypostoma/ (Pancroft) representing a new family of hosts (Mobulidae) for tetraphyllideans. Both new species can be distinguished from all others by the number and arrangement of bothridial loculi, position of the genital pore, and testes number and distribution. A new host and additional data are presented for /Phoreiobothrium triloculatum/ Tinton, 1901. The validity of /Caulobothrium/ Paer, 1948, and /Pha'dotobothrium/ Fuzet, 1953, is discussed.

77-001532 Campbell, R. A. TWO NEW SPECIES OF /ECHENEIOTHRIUM/ (CESTODA: TETRAPHYLLIDEA) FROM SKATES IN THE WESTERN NORTH ATLANTIC. J. Parasitol. 61 (1): 95-99. Feb. 1975. SFA 22(3)

[Dep. Biol., Southeast Mass. Univ., North Dartmouth 027471
/Echeneiobothrium bathyphilum/ sp. n. is described from the deep-sea skate, /Raia bathyphila/ Holt and Byrne. /Echeneiobothrium sobrinum/ sp. n., a parasite in the spiral intestine of the skates /Raia ocellata/ Mitchell and /Raia erinacea/ Mitchell, is described from Vineyard Sound near Woods Hole, Massachusetts. Additional data are given for /P. vernetiae/ Fuzet, 1956, from living and fixed specimens obtained from the type host in the type locality. Morphology of the strobilae and bothridia, testes numbers, and cirrus pouch dimensions clearly distinguish the new species from all others.

77-001533 Carvajal, J.; Campbell, R. A. /PHINOPTERICOLA MEACANTHA/ GEN. ET SP. N., REPRESENTING A NEW FAMILY OF TRYPANORHYNCH CESTODES FROM THE COWNOSE RAY, /PHINOPTERA BONASUS/ (MITCHILL 1815). J. Parasitol. 61 (6): 1023-1030. Dec. 1975. SFA 22(3)

[Lab. Zool., Univ. Catolica, Santiago, Chile] /Phinoptericola meacantha/ gen. et sp. n. from the spiral valve of the cownose ray, /Phinoptera bonasus/ (Mitchill), taken in Chesapeake Bay, Virginia, is described. A new family, Phinoptericolidae, is erected to accept the species. Distinguishing characteristics of the species include: 4 bothridia; heteroacanthous, heteromorphous, atypical armature; absence of sensory pits; an ovary consisting of 4 lobes but lacking a central isthmus; an ooreceptacle; and a uterus with 2 lateral diverticula at its proximal end.

77-001534 Carvajal, J.; Campbell, R. A.; Cornford, P. M. SOME TRYPANORHYNCH CESTODES FROM HAWAIIAN FISHES, WITH DESCRIPTIONS OF FOUR NEW SPECIES. J. Parasitol. 62 (1): 70-77. Feb. 1976. SFA 22(3)

[Lab. Zool., Inst. Cien. Biol., Univ. Catolica Chile, Casilla 114-D, Santiago, Chile] Examination of teleost and elasmobranch fishes for cestodes from the Pacific Ocean off the Hawaiian Islands resulted in the recovery of 7 species of trypanorhynchs, 4 of which are new. The new species are /Pseudoqrillotia basipunctata/, /Pterobothrium hawaiiensis/, /Prochristianella micracantha/, and /Nybelinia basimegacantha/. /Tentacularia corvohaena/ Rosc 1797, /Dasyrhynchus giganteus/ (Diesing 1850), and /Parachristianella monomegacantha/ Kruse 1959 represent new host and distribution records. The family Pseudoqrillotiidae Dollfus 1969 is emended.

77-001535 Carvajal, J.; Dailey, M. D. THREE NEW SPECIES OF /ECHENEIBOTHRIUM/ (CESTODA: TETRAPHYLIDAE) FROM THE SKATE, /RAJA CHILENSIS/ GUICHENOT, 1948, WITH COMMENTS ON MODE OF ATTACHMENT AND HOST SPECIFICITY. J. Parasitol. 61 (1): 89-94. Feb. 1975. SFA 22(3)
[Lab. Zool., Inst. Cien. Biol., Univ. Catolica Chile, Casilla 114-n, Santiago, Chile] /Echeneibothrium multiloculatum/ sp. n., /P. williamsi/ sp. n., and /P. megalosoma/ sp. n. are described from the spiral valve of 90 specimens of /Raja chilensis/ collected off central Chile. In /Echeneibothrium/ infections, attachment sites and host infectivity are indicated as at least a partial function of holdfast type, mucosal pattern, and first worms established. This is the first report of the genus /Echeneibothrium/ from South American waters.

77-001536 Cloutman, D. G.; Becker, D. A. SOME ECOLOGICAL ASPECTS OF /ERGASILUS CENTRARCHIDARUM/ WEIGHT (CRUSTACEA: COPEPODA) ON LARGemouth AND SPOTTED BASS IN LAKE FORT SMITH, ARKANSAS. J. Parasitol. 63 (2): 372-376. Apr. 1977. SFA 22(3)

[Environ. Lab., Duke Power Co., Pt 3, Box 90, Huntersville, NC 28078] Certain ecological aspects of /Ergasilus centrarchidarum/ on largemouth and spotted bass from Lake Fort Smith, Arkansas, were studied during July 1970 through June 1971. There were no significant differences in /E. centrarchidarum/ intersities between host sexes. /P. centrarchidarum/ tended to increase in abundance with the age of the hosts through the first 3 years, then declined in older hosts. Maximum abundance and egg production occurred during the summer months. Optimum temperatures for abundance and egg production ranged from 24 to 29 C. There was no evidence of antagonism among /P. centrarchidarum/ and other concomitant species of gill parasites.

77-001537 Combs, D. Y.; Williams, J. C.; Harlev, J. P. NEW HOST RECORDS FOR /ANONCHOPATOR MUELLERI/ (TREMATODA: MONOGENEA) FROM CATOSTOMID FISHES OF THE KENTUCKY RIVER. Proc. Helminthol. Soc. Wash. 43 (1): 84. Jan. 1976. SFA 22(3)

[N.F. Reg. Res. Stn., 4101 Boston Ave., Muskogee, OK]

77-001538 Cooper, C. I.; Ashmead, F. B.; Crites, J. L. PREVALENCE OF CERTAIN ENDOPARASITIC HELMINTHS OF THE YELLOW PERCH FROM WESTERN LAKE ERIE. Proc. Helminthol. Soc. Wash. 44 (1): 96. Jan. 1977. SFA 22(3)

[Dep. Zool., Ohio State Univ., Columbus 43210]

77-001539 Cordero-del-Campillo, M.; Alvarez-Pellitero, M. P. /SPINITECTUS GORDONI/ N. SP. (NEMATODA: SPIRURIDAE) FROM BROWN AND RAINBOW TROUTS IN NW SPAIN. Rev. Iber. Parasitol. 36 (1-2): 35-66. Jan.-June 1976. In English with Spanish summ. SFA 22(3)

/Spinitectus gordonii/ n. sp. a parasite of the esophagus (larvae) and stomach (adults) of brown and rainbow trout in Leon (NW Spain) is described. Altogether, 3,139 larvae and 973 adult worms were collected, and up to 39.6 percent of trout were found infected in the enzootic area. The proposed new species seems to be quite specific for trout, for 227 specimens of Cyprinidae and 4 of the Centrarchidae fishes living in the same habitat were unaffected. Comparisons are made with 70 /Spinitectus/ spp., 12 of which are related, 41 clearly different and 17 as yet insufficiently described. Drawings of eggs, L 3, L 4, males and females are given.

77-001540 Dickinson, A. B.; Threlfall, W. METAZOAN PARASITES OF /FUNDULUS HETEROCLITUS/ (LINNAEUS, 1766) FROM INSULAR NEWFOUNDLAND. Proc. Helminthol. Soc. Wash. 42 (2): 111-116. July 1975. SFA 22(3)
 [Dep. Biol., Memorial Univ., St. John's, NF, Canada] Five hundred and fifty-seven /Fundulus heteroclitus/ (Linnaeus, 1766), from four locations on the west coast of insular Newfoundland, were examined for metazoan parasites, using conventional parasitological techniques. Six genera of parasites were recovered (two Monogenea, two Digenea, one Cestoda, one Acanthocephala). It was found that the parasite burden (/Gyrodactylus prolonis/, /G. stephanus/, /Procleidus angularis/, /Homalometron pallidum/, and /Neoechinorhynchus rutili/) of /F. heteroclitus/ was not homogeneous for sample area, sex of host (Monogenea), and length of host. Significant differences in the preferred site of attachment of the three species of Monogenea were noted. Seasonal variations in incidence and intensity were noted for some parasite species. Seasonal cycles were related to seasonal variations in selected environmental factors, and possible changes in host diet and physiology.

77-001541 Dickinson, A. B.; Threlfall, W. SOME PARASITES OF /FUNDULUS DIAPHANUS/ AND /PUNGITIUS PUNGITIUS/ FROM INSULAR NEWFOUNDLAND. Proc. Helminthol. Soc. Wash. 43 (1): 86-87. Jan. 1976. SFA 22(3)
 [Dep. Biol., Memorial Univ. Newfoundland, St. John's, NF A1C 5S7, Canada]

77-001542 Dronen, N. O., Jr.; Underwood, H. T.; Suderman, M. T. /TEXTREMA HOPKINSI/ GEN. ET SP. N. (DIGENEA: CRYPTOZONIMIDAE) FROM THE LARGEMOUTH BASS OF CENTRAL TEXAS. J. Parasitol. 63 (2): 282-284. Apr. 1977. SFA 22(3)
 [Dep. Biol., Coll. Sci., Texas A&M Univ., College Station 77843]

77-001543 Eisen, S. INCIDENCE OF /LENAEA CYPRINACEA/ AMONG GOLDFISH OF NORTH POND, KELLEY'S ISLAND, OHIO. Ohio J. Sci. 77 (1): 48-49. Jan. 1977. SFA 22(3)
 [Zool. Dep., Indiana Univ., Bloomington 37401]

77-001544 Euzet, L.; Dossou, C. [A NEW MONOGENEAN GENUS (/BOUIXELLA/ N.G.) IN THE MORMYRID FISH FROM BENIN (AFRICA).] C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Nat. 283 (12): 1413-1416. Nov. 1976. In French with English summ. SFA 22(3)
 [Lab. Zool., Univ. Natl. Benin, B.P. n° 526, Cotonou, Benin, Africa] Study of the Monogenean gill parasites occurring in the Mormyrid fish from Benin (Africa). Description of a new genus, /Bouixella/. It differs from the other /Ancyrocephalidae/ by the number (4) of cross bars between the haptorial hamuli. This new genus seems to be specific of the /Mormyridae/ among which a new example of simultaneous gill parasitism by congeneric species is reported.

77-001545 Euzet, L.; Wahl, E. /BICOTYLOPHORA BAERI/ N. SP. (MONOGENEA) PARASITE BRANCHIAL DU TELEOSTEEN /TRACHINOTUS FALCATUS/ (L., 1758) EN COTE-D'IVOIRE. [BICOTYLOPHORA BAERI/ N. SP. (MONOGENEA) PARASITE FROM THE GILLS OF /TRACHINOTUS FALCATUS/ (L., 1758) IN IVORY COAST.] Rev. Suisse Zool. 84 (1): 71-79. 1977. In French with English and German summ. SFA 22(3)

77-001546 Fallon, M. P.; Wallace, D. C. THE OCCURRENCE OF /PHYLLODISTOMUM UNDULANS/ IN THE URINARY BLADDER OF THE MOTTLED SCULPIN, /COTTUS BAIRDI/. Trans. Am. Fish. Soc. 106 (2): 189-191. Mar. 1977. SFA 22(3)

[Great Lakes Res. Div., Univ., Mich., Ann Arbor 481051]

77-001547 Grimes, L. R.; Miller, G. C. CARYOPHYLLAEID CESTODES IN THE CREEK CHUBSUCKER, /EPIMYZON OBLONGUS/ (MITCHILL), IN NORTH CAROLINA. J. Parasitol. 61 (5): 973-974. Oct. 1975. SFA 22(3)

[Dep. Zool., N. Car. State Univ., Raleigh 27607]

77-001548 Grimes, L. R.; Miller, G. C. SEASONAL PERIODICITY OF THREE SPECIES OF CARYOPHYLLAEID CESTODES IN THE CREEK CHUBSUCKER, /EPIMYZON OBLONGUS/ (MITCHILL), IN NORTH CAROLINA. J. Parasitol. 62 (3): 434-441. June 1976. SFA 22(3)

[Dep. Zool., N. Car. State Univ., Raleigh 27607] One hundred and seventy-two specimens of /Epimyzon oblongus/ from Lake Raleigh, North Carolina, were examined for caryophyllaeid cestodes from December 1972 to July 1974. /Monobothrium ulmeri/, /Biacetabulum meridianum/, and an undescribed species of /Penarchigetes/ were recovered from the "stomach," "pyloric bend," and the first loop of the small intestine of the suckers. Infections of /M. ulmeri/ were limited to an 8-month period and were seasonally periodic in prevalence, mean intensity, maturation, and length distribution. A "temperature dependent rejection response" is discussed as a possible factor involved in the periodicity of this species. The maturation of /M. ulmeri/ corresponded closely to the host's reproductive cycle, and may have been affected by changes in the host's hormonal levels during the spring. Infections of /B. meridianum/ were present throughout the year, and exhibited a seasonal periodicity in prevalence, maturation, and length distribution. The mean intensity of infection suggests that the establishment of this species is inhibited by heavy burdens of /M. ulmeri/. /Penarchigetes/ sp. was nonseasonal in prevalence, mean intensity, and maturation. The continuous availability of infective procercooids and the lack of a sucker "rejection response" are discussed as possible explanations for this distribution. Unlike /B. meridianum/ and /Penarchigetes/ sp., the mean intensity of /M. ulmeri/ showed a close relationship with host sex.

77-001549 Gupta, N. K.; Miglani, A. DIGENETIC TREMATODES FROM MARINE FOOD FISHES AND WILD DUCKS OF PORT BLAIR (ANDAMAN AND NICOBAR ISLANDS) INDIA. Rev. Iber. Parasitol. 36 (3-4): 219-248. July-Dec. 1976. In English with Spanish summ. SFA 22(3)

[Dep. Zool., Panjab Univ., Chandigarh, India]

77-001550 Gupta, N. K.; Garg, V. K. ON TWO NEW SPIRUIROID NEMATODES FROM MARINE FOOD FISHES IN INDIA. Rev. Iber. Parasitol. 36 (3-4): 181-188. July-Dec. 1976. In English with Spanish summ. SFA 22(3)

[Dep. Zool., Panjab Univ., Chandigarh, India]



77-001551 Gupta, N. K.; Chanana, A. STUDIES ON SOME MONOGENETIC TREMATODES OF MARINE FISHES FROM LACCADIVE ISLANDS, CALICUT AND OTHER PLACES IN INDIA. PART II. Rev. Iber. Parasitol. 36 (3-4): 277-296. July-Dec. 1976. In English with Spanish summ. SFA 22(3)
[Dep. Zool., Panjab Univ., Chandigarh, India]

77-001552 Gupta, N. K.; Chanana, A. STUDIES ON SOME MONOGENETIC TREMATODES OF MARINE FISHES FROM LACCADIVE ISLANDS, CALICUT AND OTHER PLACES IN INDIA. PART I. Rev. Iber. Parasitol. 36 (3-4): 267-275. July-Dec. 1976. In English with Spanish summ. SFA 22(3)
[Dep. Zool., Panjab Univ., Chandigarh, India]

77-001553 Hanek, G.; Molnar, K.; Fernando, C. H. NEW AND PREVIOUSLY KNOWN */Dactylogyrus/* spp. FROM SOUTHERN ONTARIO FISHES. J. Parasitol. 61 (3): 421-426. June 1975. SFA 22(3)
[Mininst. Agric. Fish., Nassau, N.D., Bahamas] Six new and 15 previously described species of */Dactylogyrus/* are reported: */Dactylogyrus cernyi/* sp. n. and */D. micropogoni/* sp. n. from */Nocomis micropogon/* (Cope); */D. chrosomi/* sp. n. and */D. eos/* sp. n. from */Phoxinus eos/* (Cope); */D. hankinsoni/* sp. n. from */Hybognathus hankinsoni/* Hubbs; */D. heterolepis/* sp. n. from */Notropis heterolepis/* Eigenmann and Eigenmann; and */D. apos/* Mueller, 1938; */D. atratuli/* Hanek and Fernando, 1972; */D. attenuatus/* Mizelle and Klucka, 1953; */D. banghami/* Mizelle and Donahue, 1944; */D. bifurcatus/* Mizelle, 1937; */D. bulbosus/* Mueller, 1938; */D. bychowskyi/* Mizelle, 1937; */D. cornutus/* Mueller, 1938; */D. dubius/* Mizelle and Klucka, 1953; */D. eucalius/* Mizelle and Pegensberger, 1945; */D. lachneri/* Chien, 1971; */D. luxili/* Rogers, 1967; */D. microphalus/* Mueller, 1938; */D. reciprocus/* Rogers, 1967; and */D. rubellus/* Mueller, 1938. */D. dubius/* is redescribed, and the vagina of */D. luxili/* is figured.

77-001554 Hardisty, M. W. CYSTS AND TUMOUR-LIKE LESIONS IN THE ENDOCRINE PANCREAS OF THE LAMPREY (*/LAMPETRA FLUVIATILIS/*). J. Zool. (Lond.) 178 (3): 305-317. Mar. 1976. SFA 22(3)
[Sch. Biol. Sci., Univ. Bath, England] Histological observations on the endocrine pancreas of the upstream migrant stage of the River lamprey, */Lampetra fluviatilis/*, have revealed a relatively high incidence of cysts and other tumour-like lesions, remarkably similar to the hamartomas described in the Atlantic hagfish, */Myxine glutinosa/*. The frequency of these lesions increases throughout the migratory period from autumn to spring. In the most common type the cysts are surrounded by an intensely granular, single-layered epithelium and both the epithelial cells and the cyst contents show a marked reaction to aldehyde-fuchsin staining. In more extreme forms the breakdown of the epithelial walls of neighbouring cysts leads to the formation of large multi-locular structures occupying almost the whole of the islet organ, but no consistent evidence of changes in blood sugar levels has been obtained in animals where the islet tissue is severely affected. A smaller proportion of the animals display neoplastic developments, frequently associated with hyperplasia and vacuolization of the foregut epithelium. In such cases, there is evidence of invasiveness and the development of epithelioid nodules within the adjoining islet tissue. Cavitation within these nodules leads to the formation of cyst-like structures containing cell debris which reacts to aldehyde-fuchsin staining. The development of cysts and hyperplasia is interpreted as a renewal in the sexually mature lamprey of inherent trends towards epithelial proliferation and vacuolization that are involved during metamorphosis in the morphogenetic processes that lead to the formation of the adult foregut and cranial islet tissue.

77-001555 Heinz, M. L.; Dailey, M. D. THE TRYPANORHYNCHA (CESTODA) OF ELASMOBRANCH FISHES FROM SOUTHERN CALIFORNIA AND NORTHERN MEXICO. Proc. Helminthol. Soc. Wash. 41 (2): 161-169. July 1974. SFA 22(3)
 [Dep. Biol., Calif. State Univ., Long Beach 90840] A single new genus and eight new species of Trypanorhyncha are described from elasmobranch fishes of the Pacific Coast of Southern California and Northern Mexico. These include /Sphyricephalus belorosoma/ sp. n. from /Alopias superciliosus/ (Jowe); /Mecistothrium myliobati/ gen. et sp. n. from /Myliobatis californica/ Gill; /Prochristianella fragilis/ sp. n. from /Phinobatos productus/ Ayres; /Prochristianella minima/ sp. n. from /Urolophus halleri/ Cooper; /Futetrarhynchus litocephalus/ sp. n. from /Mustelus californicus/ Gill; /F. macrotrachelus/ sp. n. from /Mustelus californicus/; /F. schmidtii/ sp. n. from /Urolophus halleri/; and /Nybelinia anthicosum/ sp. n. from /Triakis semifasciata/ Girard. Fourteen other species and hosts are also listed representing 13 new hosts and distribution records.

77-001556 Hoffman, G. L. /APGURIUS/, A BRANCHIOPAN PARASITE OF FRESHWATER FISHES. U.S. Fish Wildl. Serv. Fish. Dis. Leaflet. 49. 9p. 1977. SFA 22(3)
 [U.S. FWS, Fish Farm. Exp. Stn., Stuttgart, AP 721601]

77-001557 Hoffman, G. L. COPEPOD PARASITES OF FRESHWATER FISH: /ERGASTIUS/, /ACHTHEPES/, AND /SALMINCOLA/. U.S. Fish Wildl. Serv. Fish. Dis. Leaflet. 48. 10p. 1977. SFA 22(3)
 [U.S. FWS, Fish Farming Exp. Stn., Stuttgart, AP 721601]

77-001558 Jov, J. F.; Price, W. W. /MACROVALVITREMATOIDES MICROPOGONI/ (PEARSE, 1949) (MONOPNEA: DICLIDOPHOROIDEA) ON THE ATLANTIC CROAKER, /MICROPOGON UNDULATUS/ (LINNAEUS) FROM TEXAS. Proc. Helminthol. Soc. Wash. 43 (1): 90-91. Jan. 1976. SFA 22(3)
 [Dep. Biol. Sci., Marshall Univ., Huntington, WV 25701]

77-001559 Kabata, Z.; Cousens, R. HOST-PARASITE RELATIONSHIPS BETWEEN SOCKEYE SALMON, /ONCORHYNCHUS NEKA/, AND /SALMINCOLA CALIFORNENSIS/ (COPEPODA: TERNAEOPODIDAE). J. Fish. Res. Board Can. 34 (2): 191-202. Feb. 1977. In English with French summ. SFA 22(3)
 [Dep. Environ., Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9P 5K6, Canada]

77-001560 Kennedy, C. R.; Rumpus, A. LONG-TERM CHANGES IN THE SIZE OF THE /POMPHORHYNCHUS LAEVIS/ (ACANTHOCEPHALA) POPULATION IN THE PIVER AVON. J. Fish Biol. 10 (1): 35-42. Jan. 1977. SFA 22(3)
 [Dep. Biol. Sci., The University, Exeter, United Kingdom] Samples of /Gammarus pulex/ and dace, /Leuciscus leuciscus/, taken from the River Avon, Hampshire, at intervals over a period of 9 years were examined for the presence of the acanthocephalan /Pomphorhynchus laevis/. Changes in the incidence and intensity of infection of /P. laevis/ in dace and in /G. pulex/ and in the frequency distribution of /P. laevis/ in dace were used as indicators of the population size of the parasite. Throughout the period of observation, the parasite showed a similar pattern of distribution along the length of the river, although at some sites its abundance varied from year to year. Levels of both incidence and intensity of infection of /P. laevis/ in both hosts at one specific locality remained fairly constant over the 9-year period, and the annual variations fell within the natural range

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of monthly variation over any 12-month period. The frequency distribution of */P. laevis/* in dace also exhibited a similar pattern throughout the period. It was thus concluded that the population size of */P. laevis/* had not changed to any great extent over the 9 years. The factors responsible for this constancy are discussed in the light of conclusions drawn from earlier work.

77-001561 Knuckles, J. L. */IEPOMIS MACROCHIRUS/* RAFINESQUE, A NEW HOST FOR */ARGULUS MACULOSUS/* WILSON. J. Parasitol. 63 (2): 383. Apr. 1977. SFA 22(3)

[Dep. Biol. Phys. Sci., Fayetteville State Univ., Fayetteville, NC 28301]

77-001562 Kruse, G. O. W. SOME DIGENETIC TREMATODES FROM FISHES OF THE BERING SEA WITH THE DESCRIPTIONS OF */PROSORHYNCHUS MIZELLEI/* SP. N. (BUCEPHALIDAE) AND */PSEUDOPPECOELUS NOSSAMANI/* SP. N. (*/OPECOELIDAE/*). Proc. Helminthol. Soc. Wash. 44 (1): 73-76. Jan. 1977. SFA 22(3)

[Univ. Neb. State Mus., Lincoln 68588] */Prosorhynchus mizellei/* sp. n. (Bucephalidae), Described from */Aptocyclus ventricosus/* (Pallas), differs from */P. squamatus/* Odhner, 1905, in the size of the pharynx and distribution of the vitellaria. */Pseudopecoelus nossamani/* sp. n. (Opecoelidae), described from */Hippoglossus stenolepis/* Schmidt, is most similar to */P. japonicus/* (Yamaqui, 1938) von Wicklen, 1946, and */P. vulgaris/* (Manter, 1934) von Wicklen, 1946, from which it differs conspicuously in the sucker ratio. */Derogenes varicus/* (O. F. Muller, 1784) Looss, 1901 (Hemiuridae), is reported from three new hosts: */Bonquillus jordani/* (Gilbert), */Lycodes palearis/* Gilbert, */Hemilepidotus hemilepidotus/* (Tilesius).

77-001563 Lopez-Poman, R.; Guevara-Pozo, D. */CYCLOCOTYLA BELLONES/* OTTO, 1821 (MONOGENEA) PRESENTE EN */MEINERTIA OESTROIDES/* EN CAVIDAD BUCAL DE */BOOPS BOOPS/* EN AGUAS DEL MAR DE ALBORAN. */CYCLOCOTYLA BELLONES/* OTTO, 1821 (MONOGENEA) FROM */MEINERTIA OESTROIDES/* WITHIN THE BUCCAL CAVITY OF */BOOPS BOOPS/* FROM THE WATERS OF THE ALBORAN SEA. Rev. Iber. Parasitol. 36 (1-2): 135-138. Jan.-June 1976. In Spanish with English summ. SFA 22(3)

/Cyclocotyla bellones/ Otto, 1821 (Monogenea) localized on */Meinertia oestroides/* Risso, 1826 within the bucal cavity of */Boops boops/* L. from the Alboran sea is studied, illustrated and measured.

77-001564 Lopez-Roman, R.; Guevara-Pozo, D. */TROCHOPHELLA CANDIDA/* EUZET Y TRILLES, 1962 Y */WINKENTHUGHESIA BRAMAE/* PARONA Y PERUGIA, 1896 BYCHOWSKY, 1957 (MONOGENEA) PARASITOS DE PECES MARINOS DEL MAR DE ALBORAN. */TROCHOPHELLA CANDIDA/* EUZET AND TRILLES, 1962 AND */WINKENTHUGHESIA BRAMAE/* (PARONA AND PERUGIA, 1896) BYCHOWSKY, 1957 (MONOGENEA) PARASITES OF MARINE FISHES OF THE ALBORAN SEA. Rev. Iber. Parasitol. 36 (1-2): 139-146. Jan.-June 1976. In Spanish with English summ. SFA 22(3)

/Trochopella candida/ Euzet & Trilles, 1962 and */Winkenthughesia bramae/* (Parona & Perugia, 1896) Bychowsky, 1957 parasites, respectively, of */Peristedion cataphractum/* L. and */Brama raii/*, fished in the Alboran Sea, are studied, measured and illustrated.

77-001565 Mackiewicz, J. S.; Deutsch, W. G. /*POWARDLEUS*/ AND /*JANISZEWSKELLA*/, NEW CARYOPHYLLID GENERA (CESTOIDEA: CARYOPHYLLIDEA) FROM /*CARPIODES CYPRINUS*/ (CATOSTOMIDAE) IN EASTERN NORTH AMERICA. Proc. Helminthol. Soc. Wash. 43 (1): 9-17. Jan. 1976. SFA 22(3)
[Biol. Sci., State Univ. N.Y., Albany 12222] /*Powardleus pennensis*/ gen. et sp. n. and /*Janiszewskella fortobothria*/ gen. et sp. n., of the family Caryophyllaeidae, are described from the host in the Susquehanna River of Pennsylvania. /*Powardleus*/ has a cuneiformolocate scolex, single gonopore, lateral vitellaria, and uterus anterior of cirrus sac; /*Janiszewskella*/ has a bothriolocolodiscate scolex, single gonopore, lateral vitellaria, and uterus posterior of cirrus sac. Illustrations and brief notes on incidence and seasonal occurrence complement the descriptions.

77-001566 Martin, W. F. /*PLETHORCHIS ACANTHUS*/ GEN. ET SP. N. (TREMATODA: SANGUINICOLIDAE) IN MULLET, /*MUGIL CEPHALUS*/ L., FROM QUEENSLAND, AUSTRALIA. Proc. Helminthol. Soc. Wash. 42 (2): 79-82. July 1975. SFA 22(3)

[Dep. Biol. Sci., Univ. South. Calif., Los Angeles 90007] Testes numbering over 100 and posterior to ceca; vitellaria mainly intercecal anteriorly and mostly asymmetrical posterior to ceca; and spined eggs are distinctive characters of /*Plethorchis*/ which is erected with /*P. acanthus*/ as type.

77-001567 Mayes, M. A.; Miller, G. C. /*CLEIDODISCUS EKYTPHUS*/ SP. N. FROM THE ROANOKE BASS, /*AMBLOPLITES CAVIFRONS*/ COPE, AND OTHER ANCYROCEPHALINAE (TREMATODA: MONOGENEA) FROM SOME NORTH CAROLINA CENTRARCHID FISHES. Proc. Helminthol. Soc. Wash. 42 (2): 146-149. July 1975. SFA 22(3)

[Sch. Life Sci., Univ. Nebr., Lincoln 68508] /*Cleidodiscus ekytphus*/ is described from the Roanoke bass, /*Ambloplites cavifrons*/ Cope, collected in eastern North Carolina. /*Cleidodiscus ekytphus*/ can be distinguished from its nearest relative, /*C. stentor*/ Mueller, 1936, by differences in the morphology of the haptor armament and by the characteristic bulblike distal expansion of the cirrus of /*C. ekytphus*/. Forty-four additional monogeneans collected from centrarchids in North Carolina are reported and a host-parasite list provided.

77-001568 Mayes, M. A.; Brooks, D. R. /*GYRODACTYLUS PLOTOSI*/ N. SP. (TREMATODA: MONOGENEA) FROM THE SILURID FISH /*PLOTOSUS LINEATUS*/ FROM THE PHILIPPINES. Trans. Am. Microsc. Soc. 96 (1): 143-145. Jan. 1977. SFA 22(3)

[Sch. Life Sci., Univ. Nebr., Lincoln 68588] /*Gyrodactylus plotosi*/ n. sp. is most similar to /*G. lavareti*/ Malmberg, 1956, from which it differs by having a smaller dorsal bar and having a distinct shelf on the hooklet toe. This is the first record of a monogenean from /*P. lineatus*/.

77-001569 Mayes, M. A. /*PROTEOCEPHALUS BUPLANENSIS*/ SP. N. (CESTODA: PROTEOCEPHALIDAE) FROM THE CREEK CHUB, /*SEMOTILUS ATROMACULATUS*/ (MITCHILL), IN NEBRASKA. Proc. Helminthol. Soc. Wash. 43 (1): 34-37. Jan. 1976. SFA 22(3)

[Sch. Life Sci., Univ. Nebr., Lincoln 68588] /*Proteocephalus buplanensis*/ sp. n. differs from /*P. ptychocheilus*/, /*P. cobraeformis*/, and /*P. torulosus*/ by the presence of a vestigial apical sucker; from /*P. percae*/ and /*P. pearsei*/ by having larger suckers and testes distributed in two layers.

77-001570 Mayes, M. A.; Johnson, C. A. III A NEW SPECIES OF /UROCLEIDUS/ (TREMATODA: MONOGENEA) FROM GILLS OF THE WHITE PERCH, /MORONE AMERICANA/ (GMELIN). J. Parasitol. 61 (6): 1050-1052. Dec. 1975. SFA 22(3)

[Univ. Nebr. Mus., Lincoln 685081 /Urocleidus nactus/ sp. n. is described from the gills of the white perch, /Morone americana/ (Gmelin), from North Carolina. /Urocleidus nactus/ is the seventh species of /Urocleidus/ to be described with a spurlike structure at the base of the anchor point and can be distinguished from other closely related species by the morphology of the hooks and of the accessory piece which is a 2-pronged fork. /Urocleidus rogersi/ Haulk and Fernando 1972 is reported from the white perch, /Morone americana/, in North Carolina, and the white bass, /Morone chrysops/ (Rafinesque), in North Carolina and Nebraska. Morphological variation of the accessory piece is described and a new interpretation of the haptor armament is presented.

77-001571 Minchew, C. D. THE OCCURENCE OF A "COILED" /METAMICROCOTYLA MACRACANTHA/ ON THE GILLS OF THE MULLET, /MUGIL CEPHALUS/. Proc. Helminthol. Soc. Wash. 44 (1): 106. Jan. 1977. SFA 22(3)

[Dep. Zool., Miss. State Univ., Mississippi State 397621

77-001572 Mokhayer, B. THE TREATMENT OF BOTHRIOCEPHALOSIS IN GRASS CARP. Riv. It. Piscic. Ittiop. 11 (4): 119-121. Oct.-Nov.-Dec. 1976. In English and Italian. SFA 22(3)

[Fac. Vet. Med., P.O. Box 3262, Tehran, Iran] The introduction of 1 mg of Yomesan per 1 g body weight of fish, cannulated in the first portion of digestive tract, removed /Bothriocephalus cowkingsensis/ from the intestine of grass carp fingerlings.

77-001573 Muzzall, P. M.; Rabalais, F. C. STUDIES ON /ACANTHOCEPHALUS JACKSONI/ BULLOCK, 1962 (ACANTHOCEPHALA: ECHINORHYNCHIDAE). II. AN ANALYSIS OF THE HOST-PARASITE RELATIONSHIP OF LARVAL /ACANTHOCEPHALUS JACKSONI/ IN /LIRCEUS LINEATUS/ (SAY). Proc. Helminthol. Soc. Wash. 42 (1): 35-38. Jan. 1975. SFA 22(3)

[Dep. Zool., Univ. N. Hamp., Durham 03824] Statistical analyses were performed on aspects of the host-parasite relationship of /Acanthocephalus jacksoni/ in /Lirceus lineatus/. The host characteristics investigated were pigmentation, sex, size, and gut contents. The sex, position, and orientation of /A. jacksoni/ cystacanths in /L. lineatus/ was also investigated. It was demonstrated that cystacanths occupied the left side of the hemocoel more often than the right, median, and opercular (gill) area. Most of the cystacanths found were facing posteriad in /L. lineatus/. Male and female cystacanths of /A. jacksoni/ were very precocious in their development in /L. lineatus/. Sexual dimorphism was apparent in cystacanths.

77-001574 Muzzall, P. M.; Rabalais, F. C. STUDIES ON /ACANTHOCEPHALUS JACKSONI/ BULLOCK, 1962 (ACANTHOCEPHALA: ECHINORHYNCHIDAE). I. SEASONAL PERIODICITY AND NEW HOST RECORDS. Proc. Helminthol. Soc. Wash. 42 (1): 31-34. Jan. 1975. SFA 22(3)

[Dep. Zool., Univ. N. Hamp., Durham 03824] /Acanthocephalus jacksoni/ has a seasonal periodicity at Jackson Cutoff (Wood County), Ohio, where it is present in the definitive hosts from December to July and absent in August to the middle of November. Factors such as water temperature, definitive host spawning period, amount of

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vegetation present, and the presence or absence of the intermediate host influencing this seasonal periodicity were investigated. /A. jacksoni/ is reported from 15 species of fish, 12 of which are new host records in Ohio streams. The isopod, /Lirceus lineatus/ (Say), is a new intermediate host for /A. jacksoni/.

77-001575 Muzzall, P. M.; Bahalais, F. C. STUDIES ON /ACANTHOCEPHALUS JACKSONI/ PULLOCK, 1962 (ACANTHOCEPHALA: ECHINORHYNCHIDAE). III. THE ALTERED BEHAVIOR OF /LIRCEUS LINEATUS/ (SAY) INFECTED WITH CYSTACANTHS OF /ACANTHOCEPHALUS JACKSONI/. Proc. Helminthol. Soc. Wash. 42 (2): 116-118. July 1975. SFA 22(3)

[Dep. Zool., Univ. N. Hamp., Durham 038241 The behavior of noninfected isopods and those infected with cystacanths of /Acanthocephalus jacksoni/ was observed in laboratory experiments. The amount of time spent by the isopods under leaves, on leaves, on floating material, wandering, and/or fighting was recorded and analyzed. Nonparasitized (pigmented) isopods spent significantly more time under leaves than did parasitized (nonpigmented) isopods. Parasitized isopods spent significantly more time "wandering" than did nonparasitized isopods. Parasitized males spent significantly more time on leaves than infected females. It is suggested that these altered behavioral responses and increased conspicuousness of infected /Lirceus lineatus/ help the transmission of the cystacanth to the definitive host.

77-001576 Nagel, M. NEW DISTRIBUTIONAL RECORDS FOR PISCICOLID LEECHES IN OKLAHOMA. J. Parasitol. 62 (3): 494-495. June 1976. SFA 22(3)

[Sch. Biol. Sci., Okla. State Univ., Stillwater 740741]

77-001577 Natarajan, P.; Nair, N. B. EFFECTS OF INFESTATION BY /LENAEENTCUS HEMIRHAMPHI/ KIRTISINGHE ON THE BIOCHEMICAL COMPOSITION OF THE HOST FISH /HEMIRHAMPHUS XANTHOPTERUS/ (VAL.). J. Anim. Morphol. Physiol. 23 (1,2): 25-31. June-Dec. 1976. SFA 22(3)

[Coll. Fish., Univ. Agric. Sci., Mangalore, 575002 India]

77-001578 Newborg, M.; Miller, P. AN UNUSUAL SPOROZOAN BLOOD PARASITE, NAMED /HAEMATRACTIDIUM SCOMBRI/ HENRY, 1910, FROM THE ATLANTIC MACKEREL, /SCOMBER SCOMBRUS/. J. Parasitol. 61 (2): 264. Apr. 1975. SFA 22(3)

[Dep. Zool., Univ. Md., College Park 207421]

77-001579 Norris, D. P.; Overstreet, R. M. /THYNNASCARIS RELIQUEUS/ SP. N. AND /T. FABENA/ (LINTON, 1900) (NEMATODA: ASCARIDOIDEA) FROM FISHES IN THE NORTHERN GULF OF MEXICO AND EASTERN U.S. SEABOARD. J. Parasitol. 61 (2): 330-336. Apr. 1975. SFA 22(3)

[Dep. Biol., Univ. South. Miss., Hattiesburg, 394011 /Thynnascaris reliques/ sp. n. is described from the type host, the sheepshead, /Archosargus probatocephalus/ (Walbaum), and other fishes of the northern Gulf of Mexico and southern Florida, including the Gulf toadfish, /Opsanus beta/ (Goode and Bean); the spiny boxfish, /Chilomycterus schoepfi/ (Walbaum); the slippery dick, /Halichoeres bivittatus/ (Bloch); and the Atlantic croaker, /Micropogon undulatus/ (Linnaeus). Its salient characters are: Length up to approximately 12.5 cm; lips broad, with pedunculate pulp and equatorially constricted flanges; esophagus 8 to 12 percent and spicules 3 to 6 percent of body length; preanal and postanal papillae up to 33 and 6 pairs, respectively. In the type host, some adults attained a

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considerably greater size than in other hosts, and their labial morphology changed as the maximum length was approached. /Thynnascaris habena/ is redescribed from the oyster toadfish, /Opsanus tau/ (Linnaeus/), its type host, on the basis of examination of specimens collected from Massachusetts, Virginia, and Georgia. /Thynnascaris melichthysi/ (Olsen, 1952) and /T. oocoecephali/ (Olsen, 1952) are transferred from the genus /Contracaecum/ as new combinations.

77-001580 Oettinger, D. F.; Buckner, R. L. /ACANTHOCEPHALUS TAHLEQUAHENSIS/ SP. N. (ACANTHOCEPHALA: ECHINORHYNCHIDAE) FROM THE STIPPLED DARTER, /ETHIOSTOMA PUNCTULATUM (AGASSI?), IN NORTHEASTERN OKLAHOMA. J. Parasitol. 62 (2): 237-241. Apr. 1976. SFA 22(3)

[Sch. Life Sci., Univ. Nebr., Lincoln 68588] /Acanthocephalus tahlequahensis/ sp. n. was recovered from the intestines of 4 species of freshwater fishes, /Ethiostoma punctulatum/, /E. spectabile/, /Nocomis asper/, and /Notropis pilshryi/, collected in northeastern Oklahoma. The new species is distinguished from all other species of /Acanthocephalus/, except /A. japonicus/ (Fukui and Morisita 1936) Petrochenko 1956, and /A. fluviatilis/ Paperna 1964, by having smaller proboscis hooks. The length of the proboscis hooks for males is 27 to 38 (33) μ m and for females 35 to 46 (42) μ m. /A. tahlequahensis/ is smaller than either /A. japonicus/ or /A. fluviatilis/, and has about half the number of longitudinal rows of proboscis hooks of /A. japonicus/ and half the number of proboscis hooks in each longitudinal row of /A. fluviatilis/. In addition to having smaller hooks, /A. tahlequahensis/ differs from other species of /Acanthocephalus/ parasitizing North American fishes by its smaller, spindle-shaped trunk and more hooks in each longitudinal row.

77-001581 Olson, A. C., Jr. /ASYMPHYLODORA ATHERINOPSIDIS/ (TREMATODA: MONORCHIIDAE) FROM THE CALIFORNIA GRUNION, /LEURESTHES TENUIS/, INCLUDING A REDESCRIPTION. J. Parasitol. 63 (2): 295-298. Apr. 1977. SFA 22(3)

[Dep. Zool., San Diego State Univ., San Diego, CA 92182]

77-001582 Olson, A. C., Jr. METACERCARIA OF /BUCEPHALOPSIS LABIATUS/ (TREMATODA: BUCEPHALIDAE) IN THE CALIFORNIA GRUNION, /LEURESTHES TENUIS/. J. Parasitol. 61 (1): 50. Feb. 1975. SFA 22(3)

[Dep. Zool., San Diego State Univ., San Diego, CA 92182]

77-001583 Paperna, J. LARVAL /CONTRACAECUM/ (NEMATODA, ANISAKIDAE) IN THE PERICARDIUM OF FISHES FROM EAST AFRICAN LAKES. Proc. Helminthol. Soc. Wash. 41 (2): 252. July 1974. SFA 22(3)

[H. Steinitz Mar. Biol. Lab., Rlat, Israel]

77-001584 Pascoe, D.; Cram, P. THE EFFECT OF PARASITISM ON THE TOXICITY OF CADMIUM TO THE THREE-SPINED STICKLEBACK, /GASTROSTUS ACULEATUS/ L. J. Fish Biol. 10 (5): 467-472. May 1977. SFA 22(3)

[Dep. Appl. Biol., Univ. Wales Inst. Sci. Technol., Cathays Park, Cardiff, Wales] The toxicity of cadmium to sticklebacks was determined over a wide range of concentrations. The 96 h LC50 was found to be 6.5 mg Cd l⁻¹. The shape of the time-concentration curve suggests that cadmium may have two toxic mechanisms. The median period of survival for fish infected with the plerocercoids of the cestode, /Schistocephalus solidus/, was found to be considerably shorter than for non-parasitized fish. This observation is considered in the light of the known effects of /S. solidus/ on its host.

77-001585 Peters, G. THE PAPILLOMATOSIS OF THE EUROPEAN EEL (*ANGUILLA ANGUILLA* L.): ANALYSIS OF SEASONAL FLUCTUATIONS IN THE TUMOR INCIDENCE. Arch. Fischereiwiss. 27 (3): 251-263. Mar. 1977. In English with German summ. SFA 22(3)

[Inst. Hydrobiol. Fischereiwiss., Univ. Hamburg, West Germany] The eels of the Lower Elbe River show a high incidence of epidermal papillomas mostly located about the mouth area. In spring and autumn comparatively few fish are afflicted. Their tumors are small. In summer the rate of incidence reaches its maximum with a high average tumor size. Even the color and morphology of the tumors vary seasonally. This disease afflicts most strongly eels 15-25 cm in length. Smaller eels usually have the smaller tumors. The size of papillomas in the larger eels is very variable. In the latter there also occur scarred or ulcerous jaws. Under experimental conditions the growth of the tumors shows a definite temperature dependency: at 8°C growth stagnates or the tumors even shrink; at 15° and 22°C growth is rapid. When the eels are kept in group tanks at high temperatures, there is a marked decrease in the total volume of the papillomas within a few weeks. Vicious fights among the animals lead to mechanical destruction of the papillomas or to the death of the eels. Thus the incidence and size fluctuations in the field seem to be caused by temperature dependent growth rate or shrinkage of the papillomas, the mechanical destruction of larger tumors, and the disease related deaths of smaller individuals.

77-001586 Rawson, M. V., Jr. POPULATION BIOLOGY OF PARASITES OF STRIPED MULLET, *MUGIL CEPHALUS* L. CRUSTACEA. J. Fish Biol. 10 (5): 441-451. May 1977. SFA 22(3)

[Sea Grant Advis. Serv., Auburn Univ., 800 Downtowner Blvd., Suite 104, Mobile, AL 36609] Class 0 and class 1 striped mullet, *Mugil cephalus*, were collected from May 1970 to June 1971 to study development, seasonal abundance of parasite populations, and distribution of gill parasites. Crustacean parasites observed were *Ergasilus lizae*, *E. versicolor*, *E. funduli*, *Bomolochus concinnus*, *Brachiella oblonga*, *Caligus rufimaculatus*, *Clavella inversa*, *Lernaeenicus longiventris*, *Argulus funduli* and *A. chesapeakeensis* sp. n. Cressey. Cyclopoid copepods initially infected class 0 mullet in late spring and populations were characterized by surges in intensity at 6 to 8 week intervals. Caligoid copepods initially infected class 0 mullet in late summer and fall or appeared only on class 1 mullet. Intensity remained low, but they were observed consistently. Branchiurans were rarely observed on class 0 mullet and occurred consistently at low intensity on class 1 mullet. Study of distribution of five gill parasites indicated a high degree of gill habitat subdivision, but competitive exclusion was not observed.

77-001587 Rogers, W. A. FOUR NEW SPECIES OF *GYRODACTYLUS* FROM FISHES OF ALABAMA. J. Parasitol. 61 (1): 51-53. Feb. 1975. SFA 22(3)

[Agric. Exp. Stn., Auburn Univ., Auburn, AL] Four new species of *Gyrodactylus* are described from fishes of Alabama. *Gyrodactylus dorosomae* was collected from *Dorosoma cepedianum* (Le Sueur) and *D. petenense* (Günther); *G. parvicirrus* from *Notropis atherinoides* Raf.; *G. lythruri* from *Notropis b. bellus* Ray and *N. atrapiculus* Nelson; and *G. nigrum* from *Etheostoma nigrum* Raf.

77-001588 Rubertone, J. A.; Fall, J. F. A SURVEY OF FISH PARASITES FROM THE GREENBRIER RIVER. *Proc. Helminthol. Soc. Wash.* 42 (1): 58-59. Jan. 1975. SFA 22(3)

[Dep. Biol., W. Va. Univ., Morgantown 265061 Ninety-nine fish representing 13 species were collected from the Greenbrier River below Alderson, West Virginia, from May through September 1972 and 1973 and examined for helminth parasites. Eighteen species representing 17 genera of parasites were recovered and identified. These species include nine trematodes, five cestodes, three nematodes, and one acanthocephalan.--From text.

77-001589 Sato, M.; Yoshinaka, F.; Ikeda, S. LATHYRITIC CHANGES IN CARP CAUSED BY BETA-AMINOPROPIONITRILE AND D-PENICILLAMINE. *Bull. Jpn. Soc. Sci. Fish.* 43 (3): 349-355. Mar. 1977. SFA 22(3)

[Dep. Fish., Fac. Agric., Kyoto Univ., Kyoto, Japan] Carp were fed diets containing either 0.3 percent Beta-aminopropionitrile (Beta-APN) or 0.3 percent D-penicillamine. On the 67th day of the feeding, skeletal deformity was identified in 25 percent of the fish given Beta-APN and 32 percent of those given D-penicillamine. X-ray examination of the abnormal fish showed severe spinal curvature at the region of 12th to 16th vertebrae, separation and fracture of the vertebral column, deformation of the ribs, and fracture of the rib in its basal part. In addition, fish given these drugs exhibited hemorrhage in the fins, the skin, and the viscera, and fragility of the connective tissues. Carp, when injected intraperitoneally with these drugs, also showed similar toxic symptoms. These experimental results indicated that Beta-APN and D-penicillamine caused lathyrctic changes in carp similar to those seen in rats and chickens.

77-001590 Schell, S. C. THE LIFE HISTORY OF *PLAGIOPODUS SHAWI* (MCINTOSH 1939) (TREMATODA: OPFICOPLIDAE), AN INTESTINAL PARASITE OF SALMONID FISHES. *J. Parasitol.* 61 (5): 899-905. Oct. 1975. SFA 22(3)

[Dep. Biol. Sci., Univ. Idaho, Moscow 838431 *Plagiopod shawi* is transferred to the genus *Plagioporus*. The miracidium develops and hatches in 11 to 14 days at 22 to 25 C. The operculate snail, *Lithoglyphus virens*, serves as first intermediate host. Mother and daughter sporocysts develop, the latter producing cotylomicrocercous cercariae within 90 to 130 days. Cercariae encyst in the amphipod, *Hyalella azteca*; stonefly nymphs of the genus *Arcynopteryx*; mayfly nymphs of the genera *Heptagenia* and *Paraleptophlebia*; chironomid larvae of the genera *Chironomus*, *Polypedium*, *Phaenosectra*, *Ablabesmyia*, and *Psectrocladius* and caddis larvae of the genera *Brachycentrus*, *Limnephilus*, and *Hydropsyche*. Metacercariae 60 to 100 days old were fed to young steelhead trout, *Salmo gairdneri*, and partially developed specimens of *P. shawi* were recovered 26 days later. Stonefly nymphs are believed to be the most important second intermediate host in the natural environment. The parasite seems to be restricted to the Pacific Northwest of the United States and has been reported from the silver salmon, *Oncorhynchus kisutch*; kokanee, *O. nerka*; cutthroat trout, *Salmo clarki*; steelhead trout, *S. gairdneri*; and the mountain whitefish, *Prosopium williamsoni*.

77-001591 Sjoblom, V.; Kuittinen, E. PHOCASCARIS SP. (NEMATODA) LARVAE IN BALTIC HERRING, A NEW PARASITE FOR THE BALTIC SEA. Finn. Fish. Res. 2: 1-3. 1976. SFA 22(3)

[Finnish Game Fish. Res. Inst., P.O.B. 193, SF-00131 Helsinki 13, Finland] Since larvae of /Anisakis/ sp. (Nematoda) are frequently found in herring from the Southern Baltic Sea a search was made for parasite in fish caught off the Finnish coast. In all 3,500 Baltic herring were inspected after treatment with citric acid-pepsin, but no /Anisakis/ larvae were found. However, some fish contained larvae of /Phocascaris/ sp. (Nematoda) a parasite new to the Baltic Sea. The prevalence of the species seems to be small, only 29 larvae were found.

77-001592 Smith, A. C.; Hartley, P. K. KELOID IN THE GRAY REEF SHARK, /CARCHARHINUS AMBLYRHYNCHOS/. Pac. Sci. 30 (2): 109-112. Apr. 1976. SFA 22(3)

[John A. Burns Sch. Med., Univ. Hawaii, 1960 East-West Road, Honolulu 96822] A gray reef shark, /Carcharhinus amblyrhynchos/, was captured at Fnewetak Atoll, the Marshall Islands, in 1972. Near the right pectoral fin was a large fungating tumor. Microscopically, no evidence of microorganisms or definite malignant transformation was observed, and inflammation and necrosis were minimal. However, the tumor appeared to be a keloid, the first to be reported in sharks.

77-001593 Stromberg, P. C.; Crites, J. L. POPULATION BIOLOGY OF /CAMALLANUS OXYCEPHALUS/ WAPD AND MAGATH, 1916 (NEMATODA: CAMALLANIDAE) IN WHITE BASS IN WESTERN LAKE ERIE. J. Parasitol. 61 (1): 123-132. Feb. 1975. SFA 22(3)

[Dep. Zool., Ohio State Univ., 1735 Neil Ave., Columbus 43210] Infection was generally more frequent and of higher intensity in large fish. The data show seasonal cycles in population structure, site selection, intensity of infection, maturation, and reproduction. Infection occurs during July and August with a resulting peak in population density; during late summer and autumn, mortality, probably density-dependent, reduces the population by 30 to 60 percent; surviving worms are eliminated at 1 year of age. Growth and development of female worms is arrested from November to April, then proceeds at a rapid rate until the worms release their larvae and die. The dispersal period of the nematode coincides with the annual maximum density of the intermediate host, a cyclopoid copepod, and is interpreted as an adaptation which increases the probability of successful transmission. Because the number of larvae produced by each female worm is a function of body volume, natural selection has favored rapid spring growth and attainment of large body size relative to the male worm. Both seasonal timing in the life cycle and the number of larvae produced are important factors in determining the abundance of this and perhaps other parasites. Evidence is presented suggesting that fluctuations of environmental parameters may disrupt the timing of transmission and alter the distribution and abundance of the parasite. It is hypothesized that the magnitude of such changes in parasite abundance may be related to the complexity of the host-parasite system.--From abstr.

77-001594 Sullivan, J. R. /TURGECAECUM LONGIFAUCES/ GEN. ET SP. N. (DIGENEA: CRYPTOCONIMIDAE) FROM SUWANEE BASS, /MICROPTERUS NOTIUS/ BAILEY AND HUBBS, AND EMENDATION OF THE SUBFAMILY CAECINCOLINAE YAMAGUTI 1958. J. Parasitol. 61 (5): 868-869. Oct. 1975. SFA 22(3)
[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830] A new trematode of the family Cryptogonimidae is described from Suwanee bass (/Micropterus notius/ Bailey and Hubbs) from Florida. /Turgecaecum longifauces/ gen. et sp. n. is characterized by having a long esophagus, precircular acetabula, short expanded ceca and vitellaria in the shoulder region. It is placed in the subfamily Caecincolinae and is compared with Caecincola/ Marshall and Gilbert 1905, the only other genus in the subfamily. Emendments to the subfamily are made.

77-001595 Suppes, V. C.; Meyer, F. P. /POLYPODIUM/ SP. (COELENTERATA) INFECTION OF PADDLEFISH (/POLYODON SPATHULA/) EGGS. J. Parasitol. 61 (4): 772-774. Aug. 1975. SFA 22(3)
[Mo. Dep. Conserv., RR 2, Sweet Spring 653511]

77-001596 Sweeting, P. A. STUDIES ON /LIGULA INTESTINALIS/. SOME ASPECTS OF THE PATHOLOGY IN THE SECOND INTERMEDIATE HOST. J. Fish Biol. 10 (1): 43-50. Jan. 1977. SFA 22(3)
[Thames Conserv. Div., Nugent House, Vastern Rd., Reading, Berks RG1 8DB, England] A 3 year survey of a lake, in which 120 roach, /Rutilus rutilus/, were examined revealed the presence of the plerocercoids of /Ligula intestinalis/ in more than 90 percent of the fish. The average number of parasites per fish was 4.2 although fish exceeding 32 g were not ligulosed. Gudgeon, /Gobio gobio/, of all sizes were affected. Implants of the plerocercoids into small roach, gudgeon and goldfish, /Carassius auratus/, were successful but not in the case of /Perca fluviatilis/, /Esox lucius/ and /Leuciscus cephalus/. The pathological effects of the plerocercoids on roach and gudgeon are described.

77-001597 Thatcher, V. E.; Dossman M., D. /UNICOELIUM PROCHILODORUM/ GEN. ET SP. N. (TRIFMATODA: EAPIOPOPIDAE) FROM A FRESHWATER FISH (/PROCHILODUS RETICULATUS/) IN COLOMBIA. Proc. Helminthol. Soc. Wash. 42 (1): 28-30. Jan. 1975. SFA 22(3)
[Fund. Educ. Sup., Cali, Colombia] /Unicoelium prochilodorum/ gen. et sp. n. is described from the intestinal tract of a Colombian freshwater characid fish, /Prochilodus reticulatus/Steindachner. The new form is included in the subfamily Unisaccinae Martin, 1973, because of the union of the intestinal branches. The new genus differs from others in the subfamily by the more posterior position of the ovary, testis, vitelin glands, and acetabulum, and by the more anterior extension of the uterus and the receptaculum seminis uterinum.

77-001598 Timmons, T. J.; Rogers, W. A. /DACTYLOGYPUS ATRIPINNEI/ SP. N. FROM THE BLACKFIN SUCKER IN TENNESSEE. J. Parasitol. 63 (2): 238-239. Apr. 1977. SFA 22(3)
[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830]

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77-001599 Uhazy, L. S. BIOLOGY OF /PHILOMETROIDES HURONENSIS/ N.SP. (NEMATODA: DRACUNCULOIDEA) OF COMMON WHITE SUCKER (/CATOSTOMUS COMMERSONI/). Ph.D. dissertation, Univ. Guelph (Canada). 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

A new species of nematode, /*Philometroides huronensis*/ is described from the fins and the peritoneum around the swimbladder of the common white sucker (/Catostomus commersoni/ Lacepede) from Lake Huron. Gravid females and males of the new species are readily distinguished from those of other members of the genus. Development of the larval stages took place in the haemocoel of the copepods /Cyclops bicuspidatus thomasi/ (Forbes) and /C. vernalis/ (Fischer). In /C. vernalis/ maintained at 20 to 23 C, moults from the first to second and second to third-stage occurred at 6 to 9 and 14 to 20 days, respectively, after infection. Larval stages are described. Six hundred and seventy-three white suckers collected from various locations in southern Ontario during April to November 1973 and April to December 1974 were examined for the parasite. Prevalence remained high (83 to 94 percent) and the intensity of infection relatively low throughout the year. The parasite was much less prevalent in longnose (/Catostomus catostomus/ (Forster) (24 to 67 per cent) and redbreast (/Moxostoma macrolepidotum/ (LaSaur) suckers (4 per cent) than in white sucker. Seventy-nine per cent of subgravid and gravid females were associated with pectoral fins. They were also recovered from the pelvic, dorsal and anal fins. Eighty-five per cent of infected fish had worms in 1 or 2 fins and 1 to 3 worms were recovered from 75 percent of the infected fish. Egg and larval development was associated with growth of subgravid and gravid females. An acute, local inflammation in the fin was associated with the release of the first-stage larvae by the worm.--From abstr.

77-001600 Valentine, D. W.; Phelps, R. PAPASITISM OF BARBED SURFPERCH, /AMPHISTICHUS ARGENTEUS/, BY /NECROCILA CALIFORNICA/: A FIT TO THE POISSON. Calif. Fish Game 63 (2): 129-132. Apr. 1977. SFA 22(3)

[Tetra Tech., Inc., 630 N. Rosemead Blvd., Pasadena, CA 91107]

77-001601 Vinikour, W. S. INCIDENCE OF /NEASCUS RHINICHTHYSI/ (TREMATODA: DIPLOSTOMATIDAE) ON LONGNOSE DACE, /RHINICHTHYS CATARACTAE/ (PISCES: CYPRINIDAE), RELATED TO FISH SIZE AND CAPTURE LOCATION. Trans. Am. Fish. Soc. 106 (1): 83-88. Jan. 1977. SFA 22(3)

[Div. Environ. Impact Stud., Argonne Natl. Lab. Land Reclam. Proj., Argonne, IL 60439]

77-001602 Wallace, R. K., Jr.; Sawyer, R. T. OCCURRENCE OF /MALMIANA PHILOTHERMA/ (ANNELIDA: HIRUDINEA) ON /HEMIRAMPHUS BRASILIENSIS/ (PISCES: HEMIRAMPHIDAE) IN PUERTO RICO. Bull. Mar. Sci. 27 (2): 347-348. Apr. 1977. SFA 22(3)

[Dep. fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830]

77-001603 Williams, F. H., Jr. /PILUM PILUM/ GEN. ET SP. N. (ACANTHOCEPHALA: ECHINORHYNCHIDAE) FROM FRESHWATER FISHES OF THE SOUTHEASTERN UNITED STATES. J. Parasitol. 62 (1): 102-104. Feb. 1976. SFA 22(3)

[Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez 00708] /*Pilum pilum*/ gen. et sp. n. is described from warmouth, /*Lepomis gulosus*/ (Cuvier); brown bullhead, /*Ictalurus nebulosus*/ (Lesueur); yellow bullhead, /*I. natalis*/ (Lesueur); redbreast sunfish, /*L. auritus*/ (Linnaeus); bluegill, /*L. macrochirus*/ Rafinesque; spotted sunfish, /*L. punctatus*/

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(Valenciennes); and redbfin pickerel, */Esox americanus/* (Gmelin), from the Alabama River Drainage, brown bullhead from the Mobile Bay Drainage in Alabama, and pirate perch, */Aphredoderus sayanus/* Gilliams, from an Atlantic Coast drainage in Georgia. The new genus most closely resembles the genus */Acanthocephalus/*; it differs from this genus in having a distinctive pear-shaped proboscis, a long neck, and hooks which abruptly differ in size.

77-001604 Williams, F. H., Jr.; Gaines, J. L., Jr. ACANTHOCEPHALA OF FISHES FROM MARINE AND BRACKISH WATERS OF THE MOBILE BAY REGION. J. Mar. Sci. 2 (3): 135-148. 1974. SFA 22(3)

[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830] New hosts are presented for the the acanthocephala */Floridosentis elongatus/* Ward, 1953, */Gracilisentis gracilisentis/* (Van Cleave, 1913), */Leptorhynchoides thecatus/* (Linton, 1891), and */Telosentis tenuicornis/* (Linton, 1891), from Alabama marine fishes. New localities and levels of infection for each species including */Atactorhynchus verecundum/* (Chandler, 1935) are discussed. The range for */F. elongatus/* is extended from southern Texas and Florida to Alabama in the northern Gulf of Mexico. */Gracilisentis gracilisentis/* is reported for the first time in marine waters.

POLLUTION

77-001605 Ash, G. R. THE EFFECTS OF THERMAL POLLUTION ON THE EGG SURVIVAL OF LAKE WHITEFISH (*/COREGONUS CLUPEAFORMIS/* (MITCHELL)). Proc. 10th Can. Symp. 1975: Water Pollut. Res. Can. 9-16. 1975. SFA 22(3)

[Renewable Resources Consulting Services Ltd., 11440 Kingsway Ave., Edmonton, AB, Canada]

77-001606 Beamish, R. J. ACIDIFICATION OF LAKES IN CANADA BY ACID PRECIPITATION AND THE RESULTING EFFECTS ON FISHES. Water Air Soil Pollut. 6 (2,3,4): 501-514. Sept.-Oct.-Nov. 1976. SFA 22(3)

[Fish. Mar. Serv., P.O. Box 100, Nanaimo, BC V9R 5K6, Canada] In the Sudbury region of Ontario, Canada, fallout of sulfur oxides has been shown to be responsible for damage to vegetation, lakes and fishes. The acidic fallout has been shown to effect a rate of acidification in many lakes that over several decades has resulted in the extinction of many species of fishes. Fish exhibit profound differences in acid tolerance but show some similarities in their physiological response to levels within the range of their individual susceptibilities. Prior to extinction most females of a particular species did not release their ova to be fertilized. The failure of females to spawn was coincident with an inability to maintain normal serum Ca levels. In some species growth was reduced despite an adequate supply of preferred food items. High concentrations of acid were considered to be the principal factor stressing the fish populations. Elevated concentrations of some heavy metals may add to the stress caused by high concentrations of acid.

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77-001607 Block, R. M.; Helz, G. P. (ed.) PROCEEDINGS OF THE CHLORINATION WORKSHOP. Chesapeake Sci. 18 (1): 93-160. Mar. 1977. SFA 22(3)

[Univ. Md., Chesapeake Biol. Lab., Solomons, MD 20688] A collection of 16 papers.--RS

77-001608 Brownlee, B.; Strachan, W. M. J. DISTRIBUTION OF SOME ORGANIC COMPOUNDS IN THE RECEIVING WATERS OF A KRAFT PULP AND PAPER MILL. J. Fish. Res. Board Can. 34 (6): 830-837. June 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Canada Cent. Inland Waters, Burlington, ON L7P 4A6, Canada]

77-001609 Brownlee, B.; Fox, M. E.; Strachan, W. M. J.; Joshi, S. P. DISTRIBUTION OF DEHYDROABETIC ACID IN SEDIMENTS ADJACENT TO A KRAFT PULP AND PAPER MILL. J. Fish. Res. Board Can. 34 (6): 838-843. June 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Canada Cent. Inland Waters, Burlington, ON L7P 4A6, Canada]

77-001610 Cairns, J., Jr.; Dickson, K. I.; Westlake, G. F. BIOLOGICAL MONITORING OF WATER AND EFFLUENT QUALITY. ASTM (Am. Soc. Test. Mater.) Spec. Tech. Publ. 607. 242p. 1976. Available at \$24.25 from ASTM, 1916 Race St., Philadelphia, PA 19103. SFA 22(3)

[Biol. Dep. Cent. Environ. Stud., VPI & SU, Blacksburg, VA 24061] This symposium has been organized to: evaluate present and future needs for biological monitoring (a) from both administrative and industrial points of view, and (b) for solving of watershed management problems; assess the current state of the art of biological monitoring; stimulate research in biological monitoring techniques; and bring together representatives from most of the world's laboratories currently studying problems related to biological monitoring.

77-001611 Cuellar-Chavez, R. AN APPLICATION OF A REGIONAL METHODOLOGY TO ESTIMATE POINT AND NON-POINT POLLUTIONAL LOADS DISCHARGED INTO A STREAM. Ph.D. dissertation, Univ. Texas (Austin). 119 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(5), 1976. SFA 22(3)

Evaluation of water quality changes in a stream requires identification and quantification of all point and non-point sources of pollutants in the watershed. Results of a recent U.S. Environmental Protection Agency study indicated that non-point sources were affecting downstream water quality of most of the urban areas studied to a greater extent than point sources. Municipal and industrial wastewater discharges differ from urban and rural surface storm runoff, in flow and water quality patterns with respect to time. A methodology was applied in the Lower Rio Grande Valley of Texas in order to consider point and non-point sources in a regional analysis of a stream. Identification and quantification of the sources of pollutants along the Main Floodway-Arroyo Colorado watercourse system were made, as well as an analysis of flows and quality characteristics in this stream.

77-001612 FAO of the UN. REPORT OF THE FAO/UNEP EXPERT CONSULTATION ON CONTAMINANT MONITORING. DATA ON CONTAMINANTS IN AQUATIC ORGANISMS. FAO Fish. Rep. No. 161. iii + 30p. Mar. 1975. SFA 22(3)
[Rome, Italy]

77-001613 Fox, M. F. PERSISTENCE OF DISSOLVED ORGANIC COMPOUNDS IN KRAFT PULP AND PAPER MILL EFFLUENT PLUMES. J. Fish. Res. Board Can. 34 (6): 798-804. June 1977. In English with French summ. SFA 22(3)
[Fish. Mar. Serv., Canada Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

77-001614 Gale, W. F.; Mohr, H. W., Jr. FISH SPAWNING IN A LARGE PENNSYLVANIA RIVER RECEIVING MINE EFFLUENTS. Proc. Pa. Acad. Sci. 50 (2): 160-162. 1976. SFA 22(3)
[Ichthyological Assoc. Inc., RD 1, Berwick, PA 18603] During 1974-5 eggs (or nest larvae) of 16 species of fish were found in heavily polluted portions of the Susquehanna River near Berwick, Pennsylvania. Eggs were found from March to mid-August. Walleye spawned first, but spotfin shiner spawned longest (early June to mid-August). Quillback discriminated least in spawning site selection and spawned nearly everywhere. Eggs occurred in water 0.3 to 3.6 m deep, but the most kinds were found in shallow water with strong currents. No species seemed to avoid polluted water by spawning in tributaries or in clear water below their mouths.

77-001615 Gale, W. F.; Jacobsen, T. V.; Smith, K. M. IPON, AND ITS POLE IN A RIVER POLLUTED BY MINE EFFLUENTS. Proc. Pa. Acad. Sci. 50 (2): 182-195. 1976. SFA 22(3)
[Ichthyological Assoc., Inc., RD 1, Berwick, PA 18603] Ferric iron in the Susquehanna River seemed to impair the ecosystem at all trophic levels. Standing crops of periphytic algae averaged 10 fold greater in the river above mine effluents than below them. Vascular plants in heavily polluted waters were restricted to depths of less than 80 cm (at low flow). In slightly polluted waters the standing crop of benthos, excluding chironomids, was 3,600/m², about 4 fold greater than in heavily polluted waters. Chironomids (mostly Rheotanytarsus/sp.) seemed to profit from mine drainage and up to 78,000/m² were found in heavily polluted areas. Catch/unit effort of fish was about 3 fold greater in slightly polluted waters than in heavily polluted ones.--From abstr.

77-001616 Gorham, E. ACID PRECIPITATION AND ITS INFLUENCE UPON AQUATIC ECOSYSTEMS--AN OVERVIEW. Water Air Soil Pollut. 6 (2,3,4): 457-481. Sept.-Oct.-Nov. 1976. SFA 22(3)

[Dep. Ecol. Behav. Biol., Univ. Minn., Minneapolis 55455] The impact of acid precipitation reflects a usually deleterious balance between good and bad effects which may lead to serious and sometimes extreme degradation of aquatic as well as terrestrial ecosystems, particularly around metal smelters. Addition of H ions as H₂SO₄(4), HNO₃(3), and HCl can alter and impoverish the species composition of biotic communities, and lead to severe leaching of beneficial metal cations such as Ca from ecosystems. Heavy metals and other trace elements which accompany acid precipitation may reach toxic levels, particularly where acid fallout leaches additional amounts from the soil into streams and lakes. Complex and often toxic hydrocarbons also comprise a little known organic component of acid precipitation. Alternatively, acid precipitation usually is enriched in plant nutrients such as nitrate- and ammonia-nitrogen, K, Ca, and S; and at certain concentrations some of the associated trace elements may also

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be beneficial. Moreover the initial effect of soil leaching by acid fallout may be to enrich aquatic ecosystems in metal cations such as Ca. Basic materials in air pollution, biogenic NH_3 from the soil, dust fall from arid regions, and soils rich in adsorbed metal cations or in carbonates may neutralize some of the harmful effects of acid precipitation upon ecosystems. However, associated heavy metals, other trace elements, and toxic hydrocarbons may still constitute serious problems in many environments.

77-001617 Greig, R. A.; Wenzloff, D.; Shelpuk, C.; Adams, A. MERCURY CONCENTRATIONS IN THREE SPECIES OF FISH FROM NORTH ATLANTIC OFFSHORE WATERS. Arch. Environ. Contam. Toxicol. 5 (3): 315-323. 1977. SFA 22(3)

[NMFS, Milford Lab., Milford, CT 06460]

77-001618 Gump, B. H.; Hertz, H. S.; May, W. F.; Chesler, S. N. THE HYDROCARBON BURDEN IN THE MARINE ENVIRONMENT SURROUNDING A REFINERY TANKER JETTY. J. Environ. Sci. Health A Environ. Sci. Eng. 12 (3): 105-113. 1977. SFA 22(3)

[Analyt. Chem. Div., Natl. Bur. Standards, Washington, DC 20234] In an investigation of petroleum hydrocarbons in the vicinity of a refinery docking facility in a "clean" environment, water samples taken from the surface and at a 10-m depth and sediment samples taken from a nearby beach were found to have essentially no contamination, while bottom sediment had a low level hydrocarbon contamination. Of particular interest was the relative abundance of benzo(a)pyrene in the bottom sediment.

77-001619 Hashemy-Tonkabony, S. F.; Langaroodi, F. A. DETECTION AND DETERMINATION OF CHLORINATED PESTICIDE RESIDUES IN CASPIAN SEA FISH BY GAS-LIQUID CHROMATOGRAPHY. Environ. Res. 12 (3): 275-280. Dec. 1976. SFA 22(3)

[Vet. Fac., Univ. Tehran, Tehran, Iran]

77-001620 Hendrev, G. R.; Wright, R. F. ACID PRECIPITATION IN NORWAY: EFFECTS ON AQUATIC FAUNA. J. Great Lakes Res. 2 (Suppl. 1): 192-207. 1976. SFA 22(3)

[Norwegian Inst. Water Res., Oslo 3, Norway]

77-001621 Horowitz, A.; Presley, R. J. TRACE METAL CONCENTRATIONS AND PARTITIONING IN ZOOPLANKTON, NEUSTON, AND BENTHOS FROM THE SOUTH TEXAS OUTER CONTINENTAL SHELF. Arch. Environ. Contam. Toxicol. 5 (2): 241-255. 1977.

[Dep. Earth Environ. Sci., Oceans Coll. City Univ. N.Y., Flushing 11367]

77-001622 Intergovernmental Oceanographic Commission. A COMPREHENSIVE PLAN FOR THE GLOBAL INVESTIGATION OF POLLUTION IN THE MARINE ENVIRONMENT AND BASELINE STUDY GUIDELINES. Intergov. Oceanogr. Comm. Tech. Ser. 14. 42p. 1976. SFA 22(3)

[Unesco, 7, Place de Fontenoy, 75700 Paris, France]

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77-001623 Johnson, M. G. CALORIC CHANGES ALONG PULP AND PAPER MILL EFFLUENT PLUMES. J. Fish. Res. Board Can. 34 (6): 784-790. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., Great Lakes Biolimnol. Lab., Burlington, ON L7P 4A6, Canada]

77-001624 Kaiser, K. L. E. ORGANIC CONTAMINANT RESIDUES IN FISHES FROM WIPIGON BAY, LAKE SUPERIOR. J. Fish. Res. Board Can. 34 (6): 850-855. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., Canada Cent. Inland Waters, Burlington, ON L7P 4A6, Canada]

77-001625 Kelso, J. P. M. DENSITY, DISTRIBUTION, AND MOVEMENT OF WIPIGON BAY FISHES IN RELATION TO A PULP AND PAPER MILL EFFLUENT. J. Fish. Res. Board Can. 34 (6): 879-885. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., 875 Queen St., Sault Ste. Marie, ON P6A 2B3, Canada]

77-001626 Kelso, J. P. M.; Minns, C. K.; Brouzes, R. J. P. PULP AND PAPER MILL EFFLUENT IN A FRESHWATER ENVIRONMENT. J. Fish. Res. Board Can. 34 (6): 771-775. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., 875 Queens St. E., Sault Ste. Marie, ON P6A 2B3, Canada]

77-001627 Leslie, J. K. CHARACTERIZATION OF SUSPENDED PARTICLES IN SOME PULP AND PAPER MILL EFFLUENT PLUMES. J. Fish. Res. Board Can. 34 (6): 791-797. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., Great Lakes Biolimnol. Lab., Burlington, ON L7P 4A6, Canada]

77-001628 Minns, C. K. ANALYSIS OF A PULP AND PAPER MILL EFFLUENT PLUME. J. Fish. Res. Board Can. 34 (6): 776-783. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., Great Lakes Biolimnol. Lab., Burlington, ON L7P 4A6, Canada]

77-001629 Moore, J. P.; Love, P. J. EFFECT OF A PULP AND PAPER MILL EFFLUENT ON THE PRODUCTIVITY OF PERIPLHYTON AND PHYTOPLANKTON. J. Fish. Res. Board Can. 34 (6): 856-862. June 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., Canada Cent. Inland Waters, Burlington, ON L7P 4A6, Canada]

77-001630 O'Bryan, G. K. ASPECTS OF PULP-MILL-POWER STATION INTERACTIONS: SOME EFFECTS OF HEAT ON PHYSICO-CHEMISTRY, AUTOTROPHIC ECOLOGY, AND PLANKTON METABOLISM. Ph.D. dissertation, Univ. Mo. (Columbia). 175 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

77-001631 Ogata, M.; Miyake, Y.; Kira, S.; Matsunaga, K.; Imanaka, M. TRANSFER TO FISH OF PETROLEUM PARAFFINS AND ORGANIC SULFUR COMPOUNDS. Water Res. 11 (4): 333-338. 1977. SFA 22(3)

[Dep. Public Health, Okayama Univ. Med. Sch., 2-5-1 Shikata-Cho, Okayama City, Okayama, Japan] Eels were maintained in a controlled laboratory environment in water with suspensions of crude oil. Gas chromatography of the eel flesh revealed the presence of paraffins and organic sulfur compounds whose concentration increased with rearing time.

77-001632 Overrein, L. N. A PRESENTATION OF THE NORWEGIAN PROJECT 'ACID PRECIPITATION--EFFECTS ON FOREST AND FISH'. Water Air Soil Pollut. 6 (2,3,4): 167-172. Sept.-Oct.-Nov. 1976. SFA 22(3)

[SNSF-Prog., 1432 AAS-NLH, Norway] The joint research project, 'acid precipitation--Effects on Forest and Fish' (the SNSF-project) of the Agricultural Research Council of Norway and the Norwegian Council for Scientific and Industrial Research was started in 1972. The objectives of the project are to: (1) establish as precisely as possible the effects of acid precipitation on forest and freshwater fish; and (2) investigate the effects of air pollutants on soil, vegetation, and water, required to satisfy point 1. Research activities on the project are organized and carried out mainly at four institutes. Within and between these institutes groups are formed carrying out investigations in fields including atmospheric transport and chemistry, dry deposition and leaching of foliage, forest growth, soil biology and soil chemistry, hydrological relationships of wetland, hydrobiology with special stress on fish, and hydrochemistry including snow chemistry.

77-001633 Polak, J.; Palmer, M. D. CONCENTRATION PATTERN OF CHEMICAL CONSTITUENTS IN A PAPER MILL'S EFFLUENT PLUME: DYNAMICS AND MODEL. J. Fish. Res. Board Can. 34 (6): 805-816. June 1977. In English with French summ. SFA 22(3)

[Ontario Minist. Environ., Water Resour. Br., Toronto, ON M4V 1P5, Canada]

77-001634 Portmann, J. E., (ed.) MANUAL OF METHODS IN AQUATIC ENVIRONMENT RESEARCH. PART 2--GUIDELINES FOR THE USE OF BIOLOGICAL ACCUMULATORS IN MARINE POLLUTION MONITORING. FAO Fish. Tech. Pap. No. 150. viii + 76p. June 1976. SFA 22(3)

[FAO of the UN, Rome, Italy]

77-001635 Reutter, J. M. AN ENVIRONMENTAL EVALUATION OF A NUCLEAR POWER PLANT ON LAKE ERIE: SOME AQUATIC IMPACTS. Ph.D. dissertation, Ohio State Univ. 259 p. 1976. From Diss. Abstr. Int. R Sci. Eng. 37(8), 1977. SFA 22(3)

The Toledo Edison Company and the Cleveland Electric Illuminating Company are currently building the first unit of the Davis-Besse Nuclear Power Station on the south shore of Lake Erie at Locust Point. This plant will utilize water from Lake Erie for cooling purposes and to replenish the cooling tower blowdown which will be returned to the lake at a maximum of 11.1°C above ambient. Over 2000 fish representing 24 species were tested to determine their final temperature preference. Final preference varied by species, season, and age. All species tested preferred temperatures above ambient during fall, winter, and spring, and therefore, would be attracted to thermal discharges during these seasons. Summer temperature preference were approximately ambient lake temperature or slightly higher indicating indifference or slight attraction to the periphery of thermal

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discharges and repulsion from the hottest areas. A total of 852 fish of 33 species was tested in heat shock, while 443 fish of 22 species were tested in cold shock. Results indicated that the absolute value of the shock temperature was more important than the size of the temperature change. Consequently, summer heat shocks and winter cold shocks posed the greatest problems. The maximum plume temperature during the summer was above or near the CTM of every species tested. Cold shocks became a serious threat only when ambient lake temperature was below 3°C. However, based on discharge velocities, fish swimming speeds, and temperature preferences, neither heat shocks nor cold shocks are expected to cause significant fish kills. Based on the intake location and velocity, neither impingement nor entrainment is expected to cause significant fish kills. The death of all entrained plankters is not expected to have a significant effect on the Lake Erie ecosystem due to the relatively low cooling water requirements and the rapid recovery rates of these organisms.--From abstr.

77-001636 Pokosh, D. A.; Pao, S. S.; Jurkovic, A. A. EXTENT OF EFFLUENT INFLUENCE ON LAKE WATER DETERMINED BY BACTERIAL POPULATION DISTRIBUTIONS. J. Fish. Res. Board Can. 34 (6): 844-849. June 1977. In English with French summ. SFA 22(3)

[Lab. Serv. Br., Ontario Minist. Environ., Pexdale, ON, Canada]

77-001637 Roth, I.; Hornung, H. HEAVY METAL CONCENTRATIONS IN WATER, SEDIMENTS, AND FISH FROM MEDITERRANEAN COASTAL AREA, ISRAEL. Environ. Sci. Technol. 11 (3): 265-269. Mar. 1977. SFA 22(3)

[Israel Oceanogr. Limnol. Res. Ltd., Haifa Lab., P.O.B. 1793, Haifa, Israel] Samples of water, sediment, and fish were collected along the northern part of the Mediterranean coast of Israel and analyzed for cadmium, lead, copper, zinc, nickel, and chromium by atomic absorption spectrophotometry. The obtained values showed no significant heavy metal pollution in the studied area, compared with values found in literature for metal concentrations in other parts of the world.

77-001638 Sandilands, P. G. EFFECT OF PULP MILL EFFLUENT ON THE SURFICIAL SEDIMENTS OF WESTERN NIPIGON BAY, LAKE SUPERIOR. J. Fish. Res. Board Can. 34 (6): 817-823. June 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Canada Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

77-001639 Sappo, G. B. THE FORMATION OF A LOCAL POPULATION OF BREEM, /ABRAMIS BRAMA ORIENTALIS/, IN THE HEATED WATER ZONE OF KONAKOVO POWER STATION. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (1): 35-45. 1976. SFA 22(3)

[Gos NIORKh, Konakovo, USSR] Ecological and morphological changes are revealed in the bream, /Abramis brama orientalis/, from various regions. The formation of a local population in the warm water zone of Ivan'kovo reservoir is discussed. Changes in the structure of the pharyngeal teeth in bream from the zone strongly affected by the warm water discharged from Konakovo power station are recorded.

77-001640 Seliga, T. A.; Dochinger, L. S. FIRST INTERNATIONAL SYMPOSIUM ON ACID PRECIPITATION AND FOREST ECOSYSTEM. (INTRODUCTION). Water Air Soil Pollut. 6 (2,3,4): 135. Sept.-Oct.-Nov. 1976. SFA 22(3)

[Atmos. Sci. Prog., Ohio State Univ., 2015 Neil Ave., Columbus 43210] A collection of 27 papers on acid precipitation.--PS

77-001641 Smith, W. H. B. PRODUCTIVITY MEASUREMENTS AND SIMULATION MODELS OF A SHALLOW ESTUARINE ECOSYSTEM RECEIVING A THERMAL PLUME AT CRYSTAL RIVER, FLORIDA. Ph.D. dissertation, Univ. Fla. 448 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001642 Stiefel, P. C. MERCURY IN WHITE BASS AND CARP. Ohio Dep. Nat. Resour. Div. Wildl., Columbus 29p. Aug. 1976. SFA 22(3)

[Water Res. Cent., Coll. Eng., Ohio State Univ., Columbus] The total mercury concentration was measured for several of the internal organs and for the muscle (fillet) in a series of white bass, (*Morone chrysops*), and carp, (*Cyprinus carpio*), collected from Lake Erie. The results of the study indicated that mercury tends to accumulate in the muscle of the white bass. Higher values of mercury found in the muscle, kidney and liver in the white bass and the carp support the theory that the mechanism for the uptake of mercury in these fishes is through the digestive system. The bulk of the total mercury found in the organs of the carp was shown to be in the form of an organic methylmercury complex.

77-001643 Tomkiewicz, S. M., Jr.; Dunson, W. A. AQUATIC INSECT DIVERSITY AND BIOMASS IN A STREAM marginally POLLUTED BY ACID STRIP MINE DRAINAGE. Water Res. 11 (4): 397-402. 1977. SFA 22(3)

[Dep. Biol., Pa. State Univ., University Park, 16832] Upper Three Runs receives a point source of acid mine drainage from a small acid feeder stream and the pH of the main stream falls from above 6 to about 4.5. Over the 1.2 km study section below the introduction of acid drainage, the pH rises to 5.0. This moderate degree of mine acid pollution has severely affected aquatic insect populations. The acid feeder itself (pH near 3.2) was inhabited only by a chironomid, a megalopteran (*Sialis*), and the caddisfly (*Ptilostomis*). Biomass was very low (140 mg dry weight/m²). The drainage of the acid feeder into the stream caused a drop in the Shannon-Weiner diversity index from 3.10 to 1.95, and a drop in biomass from 6.5 g/m² to 2.2 g/m². At the two stations further downstream, the diversity index remained relatively constant and the biomass leveled off at about 1.2 g/m². The number of taxa declined steadily from 30 at the control station to 13 at the lowest site. Populations of Coleoptera, Ephemeroptera and Trichoptera showed little or no recovery as the acid pollution ameliorated slightly. Representatives of the orders Diptera and Plecoptera (especially *Nemoura*) showed a decided recovery and increase in numbers near pH 5.0. If fish were able to survive in acid mine polluted waters of pH's between 4.5 and 5.0 they should find sufficient insect food for maintenance of a limited population.



77-001644 Vander Wall, J. RELATION BETWEEN NIPIGON BAY PENTHIC MACROINVERTEBRATES AND SELECTED ASPECTS OF THEIR HABITAT. J. Fish. Res. Board Can. 34 (6): 824-829. June 1977. In English with French summ. SFA 22(3)

[Ontario Minist. Environ., Thunder Bay, ON P7C 5G6, Canada]

77-001645 White, J. W.; Wollcott, W. S.; Kirk, W. L. A STUDY OF THE FISH COMMUNITY IN THE VICINITY OF A THERMAL DISCHARGE IN THE JAMES RIVER, VIRGINIA. Chesapeake Sci. 18 (2): 161-171. June 1977. SFA 22(3)

[Va. Elec. Power Co., P.O. Box 38, Mineral, VA 23117] The size, species composition and structure of the fish community in a 9.6 km stretch of the James River in the Piedmont Province of Virginia were analyzed. Twenty collections were made by electrofishing from October 1972 through September 1973 from both the north side of the river, which received a thermal discharge from an electric power station (Delta T4-14C at outfall), and the south side where temperatures were ambient. Parameters investigated were number of species, total number of individuals and the Shannon-Wiener and evenness indices of species diversity. Differences were found to exist in community structure among seasons within both the ambient and thermally influenced zones. In the ambient zone all parameters showed significant seasonal change with values lower in the winter. At the outfall station significant seasonal change occurred for only the diversity and evenness indices with values lower in the summer. Average total abundance remained lower within all seasons at the outfall station than in the ambient zone. As temperatures declined downstream from the point of effluent discharge parameter values more closely approached those on the unheated side of the river.

77-001646 Wilson, K. W.; Connor, P. M. THE EFFECT OF CHINA CLAY ON THE FISH OF ST AUSTELL AND MEVAGISSEY BAYS. J. Mar. Biol. Assoc. U. K. 56 (3): 769-780. Aug. 1976. SFA 22(3)

[Minist. Agric. Fish. Food, Fish. Lab., Burnham-on-Crouch, Essex, England] A trawl survey compared the numbers and distribution of fish on grounds affected by china clay with adjacent unaffected areas. No major differences in commercial catches between the two areas were found but china clay areas appeared to be important nursery grounds for dabs. Solenettes were only found in those areas. Mackerel and garfish were caught in water coloured with suspended china clay but on one occasion whitebait were observed to avoid the affected water. The gut contents of flatfish reflected the differences in the benthos available to them in these areas.

77-001647 Wrenn, W. R. SEASONAL OCCURRENCE AND DIVERSITY OF FISH IN A HEATED DISCHARGE CHANNEL, TENNESSEE RIVER. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 235-247. 1975/1976. SFA 22(3)

[TVA, Biothermal Res. Sect., Decatur, AL 35601] The fish population in the heated discharge channel from Colbert Steam Plant on the Tennessee River was sampled from January 1972 to December 1973 to determine the effects of temperature on species composition, relative abundance, and diversity. Electrofishing (108 samples) and gill netting (36 samples) yielded a total of 34 species; median number of species per sample for each type of gear was nine. Species that were commonly collected from the discharge channel at maximum summer temperatures (33-35C) included: spotted gar, gizzard and threadfin shad, carp, bluegill, longear sunfish, spotted bass, largemouth bass, and channel catfish. The occurrence of only three species (skipjack herring, sauger, and walleye) was considered temperature dependent; these species apparently avoided the heated effluent at temperatures

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above 30 C. Mortalities resulting from temperature differences were not observed. Regression analysis of two diversity indices computed for the electrofishing data indicated that species diversity was inversely related to temperature in the discharge channel (P less than 0.05) but that the Shannon index was not temperature dependent.

77-001648 Wunder, W. ROENTGENANALYSEN VERKURZTER FISCHWIRBELSAFULEN. A) KABELJAU (/GADUS MORHUA/ L.) UND B) MAIFISCH (/ALOSA ALOSA/ L.). [ROENTGEN-RAY ANALYSIS OF SHORTENED BACKBONES IN FISHES. A) COD (/GADUS MORHUA/ L.) AND B) ALLIS SKAD (/ALOSA ALOSA/ L.).] Arch. Hydrobiol. 75 (3): 366-401. May 1975. In German with English summ. SFA 22(3)

[Erlangen, West Germany] Near Cuxhaven in the sea sewage water from the industry play a role. The x-ray pictures of the spines of fishes show pathological deformities of the vertebrae and of the spinal discs characteristic for toxic osteosclerosis. We know the same pictures from spines of man, house animals, laboratory animals damaged by certain chemicals.

FISH KILLS

77-001649 Tramer, E. J. CATASTROPHIC MORTALITY OF STREAM FISHES TRAPPED IN SHRINKING POOLS. Am. Midl. Nat. 97 (2): 469-478. Apr. 1977. SFA 22(3)

[Dep. Biol., Univ. Toledo, Toledo, OH 43606] Summer drought caused catastrophic mortality of fishes trapped in small stream-bed pools. As they shrank, the pools were closely monitored to determine age- and species-specific patterns of mortality. In two pools heavy mortality occurred 5 days before the pools disappeared. The deaths were concentrated among species with underslung mouths and/or no air bladders; these species are unable to gulp the oxygenated surface film. In four other pools mortality was light until the last day. In five of six pools, deaths occurred primarily during the day; this was true for all species save *Carassius auratus*. Pulses of heavy diurnal mortality were generally correlated with failure of percent oxygen saturation values to recover from early morning lows. Aside from resistant young fry, there were no obvious age-specific differences in mortality. Terrestrial predators were not a significant cause of mortality since they fed mostly on dead or moribund individuals and were excluded by wire screen. Drought-stress sensitivity was not correlated with migratory vs. sedentary habits, although recolonization from downstream appeared to be more efficient than drought resistance as a means of repopulating the headwaters. By periodically decimating headwater fish faunas, summer droughts may provoke greater reproductive expenditures ("r-selection") within fish species as one proceeds upstream.

TOXICOLOGY; BIOASSAYS

77-001650 McLeay, D. J. J. Fish. Res. Board Can. 34 (4): 477-485. Apr. 1977. In English with French summ. SFA 22(3)

[Div. Appl. Biol., B.C. Research, Vancouver, BC V6S 2L2, Canada]

SPORT FISHERY ABSTRACTS

77-001651 Abernathy, A. R.; Cumbe, P. M. MERCURY ACCUMULATION BY JARGEMOUTH BASS (*MICROPTERUS SALMOIDES*) IN RECENTLY IMPOUNDED RESERVOIRS. Bull. Environ. Contam. Toxicol. 17 (5): 595-602. May 1977. SFA 22(3)

[Environ. Sys. Eng Dep., Clemson Univ., Clemson, SC 29631]

77-001652 Addison, R. F.; Zinck, M. F.; Willis, D. E. MIXED FUNCTION OXIDASE ENZYMES IN TROUT (*SALVELINUS FONTINALIS*) LIVER: ABSENCE OF INDUCTION FOLLOWING FEEDING OF P,p'-DDT OR P,p'-DDE. Comp. Biochem. Physiol. C Comp. Pharmacol. 57 (1): 39-43. 1977. SFA 22(3)

[Bedford Inst. Oceanogr., Dartmouth, NS B2Y 4A2, Canada] The characteristics of aldrin epoxidase, 7-ethoxycoumarin O-de-ethylase and Cytochrome P-450 (components of a mixed function oxidase system) in trout (*Salvelinus fontinalis*) liver are described. Feeding of p, p'-DDT or p, p'-DDE to trout over a 4 week period to produce tissue concentrations of around 20 and 60 ppm wet wt, respectively, did not induce the activities of any of the enzymes listed above, of aniline hydroxylase, nor of microsomal protein levels above those occurring in trout not exposed to these compounds.

77-001653 Adragna, P. J. AN INVESTIGATION ON THE BIOCHEMICAL AND PHYSIOLOGICAL EFFECTS OF ZINC ON FATHEAD MINNOW CELL CULTURES. Ph.D. Dissertation, State Univ. N.Y. (Buffalo). 128 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(8), 1977. SFA 22(3)

Fathead minnow cell cultures were able to adjust to a zinc stress if there was a gradual increase in the zinc content of the medium instead of an abrupt one. The cells demonstrated both morphological and physiological adjustments. In view of the fact that metal pollution of waterways often represents a gradual buildup of the pollutant and its consequences on the environment, the type of study undertaken here is of utmost importance.--From abstr.

77-001654 Atchison, G. J. THE DYNAMICS OF LIPIDS AND DDT IN DEVELOPING BROOK TROUT EGGS AND FRY. J. Great Lakes Res. 2 (1): 13-19. 1976. SFA 22(3)

[Bionucleon. Dep., Purdue Univ., West Lafayette, IN] Adult brook trout (*Salvelinus fontinalis*) were fed p, p'-DDT-³H and linolenic acid-1-¹⁴C. Eggs obtained from these fish were fertilized and incubated. The movement of ¹⁴C and ³H from the oil droplet and yolk to the embryonic body was followed. The yolk, not the oil droplet, was found to be the main storage site for DDT. Utilization of the triglyceride oil droplet began at hatching.

77-001655 Bakunov, N. A.; Garanina, S. N. ACCUMULATION OF ⁹⁰SR AND ¹³⁷CS BY MARINE AND FRESHWATER FISH OF THE CASPIAN BASIN. Sov. J. Ecol. (Engl. Transl. Ekologiya) 7 (4): 350-353. July-Aug. 1976. SFA 22(3)

The concentration of strontium ⁹⁰ and cesium ¹³⁷ and their ratio in the different fishes of the Caspian Basin were determined. It was established that in freshwater fish radiostrontium is preferentially accumulated, and in marine fish, cesium ¹³⁷. Considerable differences within the limit of one order of magnitude were found in the accumulation of these fission-produced radionuclides in the organism of various species of fish.

77-001656 Bass, M. L.; Heath, A. G. TOXICITY OF INTERMITTENT CHLORINATION TO BLUEGILL, *LEPOMIS MACROCHIRUS*: INTERACTION WITH TEMPERATURE. Bull. Environ. Contam. Toxicol. 17 (4): 416-423. Apr. 1977. SFA 22(3)

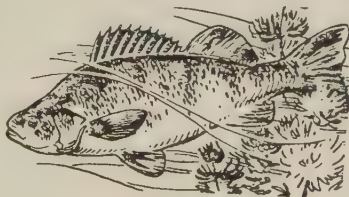
[Mary Washington Coll., Fredricksburg, VA 22401]

77-001657 Bellanca, M. A.; Bailey, D. S. EFFECTS OF CHLORINATED EFFLUENTS ON AQUATIC ECOSYSTEM IN THE LOWER JAMES RIVER. J. Water Pollut. Control Fed. 49 (4): 639-645. Apr. 1977. SFA 22(3)

[State Water Control Board, Richmond, VA] Chlorinated wastewater effluent has been proven to be highly toxic to the aquatic environment, and resulted in a major fish kill in the lower James River. The wide use of orthotolidine methods to control chlorine residuals at treatment plants can result in gross over-chlorination beyond disinfection requirements. Chlorine may affect oyster reproduction below residual levels measurable with currently available field equipment. The effects of chlorinated effluents can be mediated through strict measurement and control at treatment plants. The reduction of chlorine dose to the minimum required for disinfection can be effective in protecting aquatic organisms during critical life stages. The toxicity of chlorine to estuarine organisms seems to be similar to that of freshwater organisms. However, some estuarine species such as oyster larvae may be more susceptible to chlorinated effluents.--Concl.

77-001658 Bills, T. D.; Marking, L. L.; Chandler, J. H., Jr. FORMALIN: ITS TOXICITY TO NONTARGET AQUATIC ORGANISMS, PERSISTENCE, AND COUNTERACTION. U.S. Fish Wildl. Serv. Invest. Fish Control 73. 7p. 1977. SFA 22(3)

[U.S. FWS, Fish Control Lab., La Crosse, WI] The acute toxicity of formalin to selected fishes and aquatic invertebrates was determined in standardized laboratory tests. Fish species exposed were chinook salmon (*Oncorhynchus tshawytscha*), rainbow trout (*Salmo gairdneri*), Atlantic salmon (*S. salar*), lake trout (*Salvelinus namaycush*), black bullhead (*Ictalurus melas*), channel catfish (*I. punctatus*), green sunfish (*Lepomis cyanellus*), bluegill (*L. macrochirus*), smallmouth bass (*Micropterus dolomieu*), and largemouth bass (*M. salmoides*). Invertebrates exposed were freshwater prawn (*Palaemonetes kadiakensis*), seed shrimp (*Cypridopsis* sp.), Asiatic clam (*Corbicula leana*), snail (*Helisoma* sp.), and backswimmer (*Notonecta* sp.). Black bullhead and channel catfish were the fish most sensitive to formalin (96-h LC(50)'s, 62.1 and 65.8 ul/l), and Atlantic salmon and green sunfish were the most resistant (96-h LC(50) for each, 173 ul/l). The TLIC(50) (lethal concentration producing 50 percent mortality independent of time) for formalin against rainbow trout was 72.0 ul/l. Seed shrimp were the most sensitive invertebrates (96-h LC(50), 1.05 ul/l), and backswimmers were the most resistant (96-h LC(50), 835 ul/l). The toxicity of formalin was unchanged in solutions aged as long as 3 weeks; the biological half-life could not be determined. Formalin was not detoxified by oxidation or reduction, and filtration through activated carbon did not significantly reduce toxicity.



77-001659 Blasiola, G. C., Jr. QUINALDINE SULPHATE, A NEW ANAESTHETIC FORMULATION FOR TROPICAL MARINE FISHES. J. Fish Biol. 10 (2): 113-119. Feb. 1977. SFA 22(3)
 [Steinhart Aquarium, Calif. Acad. Sci., San Francisco 941181
 Quinaldine sulphate is demonstrated in this study to be a convenient and safe anaesthetic for use with tropical marine fishes. Both onset of anaesthesia and recovery are significantly more rapid than with the parent compound, quinaldine.]

77-001660 Block, R. M. PHYSIOLOGICAL RESPONSES OF ESTUARINE ORGANISMS TO CHLORINE. Chesapeake Sci. 18 (1): 158-160. Mar. 1977. SFA 22(3)
 [Univ. Md., Chesapeake Biol. Lab., Solomons 206881]

77-001661 Boyce, N. P.; Yamada, S. B. EFFECTS OF A PARASITE, /EUBOTHRUM SALVELINI/ (CESTODA: PSERUDOPHYLLIDEA), ON THE PERSISTENCE OF JUVENILE SOCKEYE SALMON, /ONCORHYNCHUS NEBKA/, TO ZINC. J. Fish. Res. Board Can. 34 (5): 706-709. May 1977. In English with French summ. SFA 22(3)
 [Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9P 5K6, Canada]

77-001662 Brenner, F. J.; Cooper, W. L.; MacHose, C. L. EFFECT OF TEMPERATURE AND FERRIC HYDROXIDE ON THE EMBRYONIC AND PROTEIN DEVELOPMENT OF THE COHO SALMON, /ONCORHYNCHUS KISUTCH/. Proc. Pa. Acad. Sci. 50 (2): 165-169. 1976. SFA 22(3)
 [Biol. Dep., Grove City Coll., Grove City, PA 16127] Two protein fractions were separated by paper electrophoresis in embryonic coho salmon, /Oncorhynchus kisutch/, incubated at 10°C and 16°C, in the presence and absence of ferric hydroxide. Fluctuations in protein fractions were correlated with the different developmental stages. The sodium/potassium ratio increased at the same rate during development in both groups of coho incubated at 10°C. Embryonic mortality was related to increased temperature during development rather than to ferric hydroxide.

77-001663 Brooker, M. P. THE ECOLOGICAL EFFECTS OF THE USE OF DALAPON AND 2,4-D FOR DRAINAGE CHANNEL MANAGEMENT. II. FAUNA. Arch. Hydrobiol. 78 (4): 507-525. Nov. 1976. SFA 22(3)
 [Dep. Appl. Biol., Univ. Cambridge, England] Temporal and spatial comparison was made of aquatic invertebrate populations in two reaches of a drainage channel, one subjected to hand clearance of the emergent vegetation and the other to treatment with herbicides (dalapon and 2,4-D). Interpretation of the responses of the invertebrate fauna presented some difficulties since there were substantial changes of invertebrate densities in the hand cleared reach in the second year of the study e.g. /Potamopyrgus jenkinsi/. Temporal comparison of the invertebrate community in the herbicide treated reach indicated that, in the year after the initial treatment, densities of invertebrates remained similar to the year before treatment, or substantial increases were recorded. In the latter case increases were linked with changes in the dominant plant form during the summer months and therefore resulted indirectly from herbicide treatment. The importance of the likely indirect effects of the use of dalapon and 2,4-D on avian species is discussed.

77-001664 Brown, J. P.; Chow, T. Y. HEAVY METAL CONCENTRATIONS IN ONTARIO FISH. Bull. Environ. Contam. Toxicol. 17 (2): 190-195. Feb. 1977. SFA 22(3)

77-001665 Buckley, J. A. HEINZ BODY HEMOLYTIC ANEMIA IN COHO SALMON (*ONCORHYNCHUS KISUTCH*) EXPOSED TO CHLORINATED WASTEWATER. J. Fish. Res. Board Can. 34 (2): 215-224. Feb. 1977. In English with French summ. SFA 22(3)

[Water Qual. Lab., Munic. Metro. Seattle, Seattle, WA 98104]

77-001666 Burg, A. W.; Rohovsky, M. W.; Kensler, C. J. CURRENT STATUS OF HUMAN SAFETY AND ENVIRONMENTAL ASPECTS OF FLUORESCENT WHITENING AGENTS USED IN DETERGENTS IN THE UNITED STATES. Crit. Rev. Environ. Control 7 (1): 91-120. 1977. SFA 22(3)

[Arthur D. Little, Inc., Cambridge, MA] Seven different fluorescent whitening agents are currently used in American detergents produced by the major detergent manufacturers. The total amount of fluorescent whitening agents used in 1974 was 11,000,000 lb. Fluorescent whitening agents can be identified routinely in sewage. Only trace quantities have been found in drinking waters. The concentration in various natural waters and in fish from polluted waters is usually about 0.000001 percent. The compounds all have low fish toxicity. These compounds demonstrate both a low biodegradability and a low potential for bioconcentration. Considerable information is available on the potential mammalian toxicity of fluorescent whitening agents. Tests of oral toxicity, including mutagenicity, teratogenicity, and carcinogenicity, which have been completed using high daily doses, do not indicate any hazard. Studies of the effects of the topical application of fluorescent whitening agents; including phototoxicity, carcinogenicity, and photocarcinogenicity, have been negative. Considering the low concentrations of the fluorescent whitening agents with which man comes into contact, no human health hazard from these materials can currently be projected. Epidemiological data on occupationally exposed individuals are being collected and will provide further support for subsequent projections.--Summ.

77-001667 Burton, D. T. GENERAL TEST CONDITIONS AND PROCEDURES FOR CHLORINE TOXICITY TESTS WITH ESTUARINE AND MARINE MACROINVERTEBRATES AND FISH. Chesapeake Sci. 18 (1): 130-136. Mar. 1977. SFA 22(3)

[Acad. Nat. Sci. Phila., Benedict Estuarine Res. Lab., Benedict, MD 20612] A brief introduction to toxicity testing with estuarine and marine macroinvertebrates and fish is presented. Toxicity testing terminology, test conditions and procedures are discussed with an emphasis on toxicity testing using chlorine as the toxicant.

77-001668 Cairns, J., Jr.; Calhoun, W. F.; McGinniss, M. J.; Straka, W. AQUATIC ORGANISMS RESPONSE TO SEVERE STRESS FOLLOWING ACUTELY SUBLETHAL TOXICANT EXPOSURE. Water Resour. Bull. 12 (6): 1233-1243. Dec. 1976. SFA 22(3)

[Biol. Dep., VPI & SU, Blacksburg, VA 24061] Snails, *Goniobasis livescens* (Menke), were exposed to acutely sublethal concentrations of p-nitrophenol and the lampricide, TFM and then to acutely lethal thermal shocks. The same species were also exposed to acutely sublethal concentrations of zinc followed by exposure to acutely lethal concentrations of p-nitrophenol; and to acutely sublethal concentrations of TFM followed by exposure to acutely lethal concentrations of zinc. Brown trout, *Salmo trutta*, were exposed to acutely sublethal concentrations of TFM and then to an acutely lethal thermal shock. Results of these experiments indicate that prior

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exposure to acutely sublethal toxicant concentrations may reduce survival time for a subsequent exposure to acutely lethal concentrations of a second toxicant but neither prior or concomitant exposure to acutely sublethal toxicant concentrations insures that the median survival time for a lethal exposure will be significantly altered. However, some acutely sublethal concentrations of a toxicant may significantly alter survival time of snails to a lethal concentration of a different toxicant. The brown trout exposed to an acutely sublethal concentration of TFM and then an acutely lethal thermal shock did have significantly altered survival patterns.--From abstr.

77-001669 Calabrese, A.; Thurberg, F. P.; Gould, E. EFFECTS OF CADMIUM, MERCURY, AND SILVER ON MARINE ANIMALS. Mar. Fish. Rev. 39 (4): 5-11. Apr. 1977. SPA 22(3)
[NMFS, 212 Rogers Ave., Milford, CT 06460]

77-001670 Chambers, P.; Dziuk, I. J.; Watkins, J. HYDROLYTIC ACTIVATION AND DETOXICATION OF 2,4-DICHLOROPHENOXYACETIC ACID ESTERS IN MOSQUITO FISH. Pestic. Biochem. Physiol. 7 (3): 297-300. June 1977. SPA 22(3)

[Dep. Entomol., MAFFS, Mississippi State, MS 39762] Insecticide-resistant mosquito fish (*Gambusia affinis*) were found to be slightly more tolerant to two thiol esters of 2,4-dichlorophenoxyacetic acid (2,4-D) than were fish of a susceptible population. DEF (S,S,S,-tributyl phosphorotriothioate), at 0.1 ppm for 24 hr, slightly decreased the toxicity of both esters to both populations. Comparison of esterase activities in gill and liver preparations showed that the resistant fish had lower levels of liver esterases than the susceptible fish, but results with gill preparations were not consistent. With the ethyl thiol ester, susceptible fish had the higher activity, but with butyl thiol ester, resistant fish had the higher activity. DEF inhibited activities in both tissues of both populations, but inhibition was appreciably greater in the liver. Results suggest that (i) hydrolysis in the liver activates 2,4-D esters, (ii) hydrolysis in the gill is a detoxication reaction, (iii) the slight increase in tolerance in the insecticide-resistant fish is primarily the result of decreased activation, and (iv) antagonism by DEF is the result of a greater inhibition of activation than of detoxication.

77-001671 Cooley, J. M. FILTERING RATE PERFORMANCE OF *DAPHNIA PETROCURVA* IN PULP MILL EFFLUENT. J. Fish. Res. Board Can. 34 (6): 863-868. June 1977. In English with French summ. SPA 22(3)
[Fish. Mar. Serv., Great Lakes Biolimnol. Lab., Burlington, ON L7P 4A6, Canada]

77-001672 Crawford, R. E.; Allen, G. H. SEAWATER INHIBITION OF NITRITE TOXICITY TO CHINOOK SALMON. Trans. Am. Fish. Soc. 106 (1): 105-109. Jan. 1977. SPA 22(3)
[Dep. Zool., Univ. Me., Orono 044731]

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77-001673 Cripe, C. P.; Livingston, R. J. DYNAMICS OF MIPFX AND ITS PRINCIPAL PHOTOPRODUCTS IN A SIMULATED MARSH SYSTEM. Arch. Environ. Contam. Toxicol. 5 (3): 295-303. 1977. SFA 22(3)

[U.S. EPA, Gulf Breeze, FL 32561] Three simulated marsh systems were constructed, containing sediment, marsh plants, oysters, blue crabs, fiddler crabs, and two species of top minnows. Seawater entered each of the pools by flowing across a trough, two of which contained mirex bait. Tidal fluctuations were simulated. Samples of water, bait, and animals were periodically analyzed. All animals concentrated mirex. Three photoproducts accumulated on the bait particles, and both oysters and one species of fish accumulated one of the photoproducts.

77-001674 DeGraeve, G. M.; Crutzen, T.; Ward, R. W. CHAMBER FOR HOLDING AQUATIC MICROINVERTEBRATES DURING TOXICITY TESTS IN A FLOW-THROUGH DILUTER SYSTEM. Prog. Fish-Cult. 39 (2): 100-101. Apr. 1977. SFA 22(3)

[Dep. Zool. Physiol., Univ. Wyo., Laramie 82071]

77-001675 Desai, D.; Koch, R. P. INFLUENCE OF SOLVENTS ON THE PESTICIDE INHIBITION OF ATPASE ACTIVITIES IN FISH AND INSECT TISSUE HOMOGENATES. Bull. Environ. Contam. Toxicol. 17 (1): 74-81. Jan. 1977. SFA 22(3)

[Miss. Agric. Forest. Exp. Stn., Miss. State Univ., Mississippi State 39762] It is obvious from the above studies that the type of solvent used for dissolving the chlorinated hydrocarbon pesticides, DDT and toxaphene (others should be tested as well), can have a great influence on their inhibitory action toward the ATPase system. Thus it is very important that the solvent used be clearly indicated in reporting research results. It appears that ethanol should be the solvent of choice for such studies.--From results and discuss.

77-001676 Dively, J. L.; Mudge, J. E.; Neff, W. H.; Anthony, A. BLOOD P(O₂), P(CO₂) AND PH CHANGES IN BROOK TROUT (*Salvelinus fontinalis*) EXPOSED TO SUBLETHAL LEVELS OF ACIDITY. Comp. Biochem. Physiol. A Comp. Physiol. 57 (3): 347-351. 1977. SFA 22(3)

[Dep. Biol., Pa. State Univ., University Park 16802] Acute exposure of winter and summer collected brook trout, *Salvelinus fontinalis*, to near toxic levels of acidity caused an elevation in P(CO₂), hematocrit, and rate of ventilation. Other than transient drop in P(O₂) in June exposed fish, neither hypoxemia nor blood acidosis was evidenced. Summer exposed trout which showed severe behavioral responses to acid toxication actually exhibited a moderate alkalosis.

77-001677 Drummond, R. A. DISPOSABLE ELECTRODE CHAMBER FOR MEASURING OPERCULAR MOVEMENTS OF FATHEAD MINNOWS. Prog. Fish-Cult. 39 (2): 94. Apr. 1977. SFA 22(3)

[U.S. EPA, 6201 Congdon Blvd., Duluth, MN 55804]

77-001678 Edmundson, E. H., Jr. EFFECTS OF GAMMA RADIATION AND TEMPERATURE ON GROWTH OF JUVENILE RAINBOW TROUT (*Salmo gairdneri*). Northwest Sci. 50 (3): 183-188. 1976. SFA 22(3)

[U.S. EPA, Boise, ID 83702] Effects of gamma radiation and temperature on growth of juvenile rainbow trout (*Salmo gairdneri*) were studied in continuous flow aquaria. Fish fingerlings acclimated to 10°C were exposed to various doses of gamma radiation up to 1,000 RADS and placed into filtered tap water at 10°, 15°, and 20°C. They were reared in one of these water temperatures for four weeks and fed 4 percent of their body weight in commercial fish food once per day.

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Survivors were weighed weekly and counted daily in the basic experiment. There were no statistically significant (P less than .05) effects of temperature, radiation, or temperature-radiation interaction on growth. I concluded that the combined action of gamma radiation less than 1,000 RADS and temperature regimes studied did not noticeably affect growth of juvenile rainbow trout within the first four weeks.

77-001679 Ekechukwu, G. C. A. PHARMACOKINETICS OF METHYL MERCURY BIOACCUMULATION IN CARP, *CYPRINUS CARPIO*/LINNAEUS. Ph.D. dissertation, Univ. Nev. (Reno). 167 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

To study the kinetics of methyl mercury uptake, adult *Cyprinus carpio*/Linnaeus were held in fresh-water containing 100 micrograms of mercury per liter (ppb) added in the form of methyl mercuric chloride for 50 days. After 35 days of exposure, the mean mercury tissue concentrations in the muscle, gill, pyloric caeca and kidney were 126600, 567200, 348227, and 232000 parts per billion, respectively, with a gradual levelling off of the uptake rates in the gill, pyloric caeca and the kidney. The muscle mercury uptake appeared to increase in a linear fashion throughout the study period resulting in a maximum mercury accumulation of 165875 parts per billion on the 50th day of analysis. Maximum concentrations of mercury in the gill, pyloric caeca and kidney were 573750, 466571, and 242000 ppb, respectively, on day 50. The gill accumulated the highest mercury concentration probably indicating that mercury penetration into the fish was essentially through this tissue. The comparatively very high mercury activity in the pyloric caeca may also indicate that this tissue probably serves as an avenue of mercury elimination in carp, probably through biotransformation mechanisms.--From abstr.

77-001680 Ferraro, L. A.; Wolke, P. E.; Yevich, P. P. ACUTE TOXICITY OF WATER-BORNE DIMETHYLNITROSAMINE (DMN) TO *FUNDULUS HETEROCLITUS*/ (L.). J. Fish Biol. 10 (3): 203-209. Mar. 1977. SFA 22(3)

[Univ. Pa. Sch. Vet. Med., 3800 Spruce St., Philadelphia 19174] Acute (120 h) toxicity of the water-borne carcinogen, dimethylnitrosamine (DMN) to adult *Fundulus heteroclitus*/ (L.) at 20°C and 20±2‰ salinity in natural seawater was determined. The LC-50 values were 8300 mg/l at 24h, 5500 mg/l at 48 h, 4700 mg/l at 72 h, 3300 mg/l at 96 h and 2700 mg/l at 120 h. Gross lesions consisted of peritoneal and cephalic ecchymoses. Microscopic lesions included necrosis and sloughing of the gastrointestinal mucosa, haemorrhage and necrosis of the liver, and necrosis of taste buds, with severity and incidence being a function of DMN concentration. Acute pathological effects of DMN on *Fundulus heteroclitus*/ conformed closely to those reported in other species exposed to this compound by respiratory, oral or parenteral route. DMN concentrations used in this experiment greatly exceeded those expected to be found under natural conditions, and this report is intended both to improve our understanding of DMN-induced pathology in marine fishes and to provide further evidence of the consistency of acute lesions induced by DMN, regardless of test organism or mode of exposure.

77-001681 Geiszler, P. C.; Grantham, B. J.; Blomquist, G. J. FATE OF LABELED N-ALKANES IN THE BLUF CRAB AND STRIPPED MULLET. Bull. Environ. Contam. Toxicol. 17 (4): 463-467. Apr. 1977. SFA 22(3)
[Dep. Biol., Univ. South. Miss., Hattiesburg, MS 39401]

77-001682 Grizzle, J. M. HEMATOLOGICAL CHANGES IN FINGERLING CHANNEL CATFISH EXPOSED TO MALACHITE GREEN. Prog. Fish-Cult. 39 (2): 90-93. Apr. 1977. SFA 22(3)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830]

77-001683 Guiney, P. D.; Peterson, R. F.; Melancon, M. J., Jr.; Lech, J. J. THE DISTRIBUTION AND ELIMINATION OF 2,5,2',5'-[14C] TETRACHLOROBIPHENYL IN RAINBOW TROUT (/SALMO GAIARDNERI/). Toxicol. Appl. Pharmacol. 39 (2): 329-338. Feb. 1977. SFA 22(3)
[Sch. Pharmacy, Univ. Wis., Madison 53706]

77-001684 Hale, J. G. TOXICITY OF METAL MINING WASTES. Bull. Environ. Contam. Toxicol. 17 (1): 66-73. Jan. 1977. SFA 22(3)
[U.S. EPA, Natl. Enforcement Invest. Cent., Denver, CO]

77-001685 Hansen, D. J.; Goodman, L. R.; Wilson, A. J., Jr. KEPONE: CHRONIC EFFECTS ON EMBRYO, FRY, JUVENILE, AND ADULT SHEEPSHEAD MINNOWS (/CYPRINODON VARIEGATUS/). Chesapeake Sci. 18 (2): 227-232. June 1977. SFA 22(3)

[U.S. EPA, Environ. Res. Lab., Gulf Breeze, FL 32561] We investigated the toxicity of Kepone to, and uptake by embryo, fry, juvenile, and adult sheepshead minnows (/Cyprinodon variegatus/) using intermittent-flow toxicity tests. Concentrations of Kepone and percentage of adult fish surviving in a 28-day exposure were: Control, 95 percent; 0.05 ug/liter, 95 percent; 0.16 ug/liter, 100 percent; 0.80 ug/liter, 78 percent; 1.9 ug/liter, 20 percent; and 7.8 ug/liter and 24 ug/liter, 0 percent. Concentration factors (concentrations in fish divided by concentrations measured in water) for adult fish averaged 5,200 (range 3,100 to 7,000). Symptoms of poisoning included scoliosis, darkening of the posterior one-third of the body, hemorrhaging near the brain and on the body, edema, fin-rot, uncoordinated swimming, and cessation of feeding. Adults surviving the first exposure were spawned, and the embryonic development, hatching, and survival and growth of fry and juveniles were monitored in a 36-day exposure to Kepone concentrations of 0.08, 0.18, 0.72, 2.0, 6.6, and 33 ug/liter. A significant number of embryos from adult fish exposed to 1.9 ug of Kepone/liter of water developed abnormally and died even when incubated in Kepone-free water. Kepone in water was not as lethal to progeny as to adults: 36-day LC50 for juveniles was 6.7 ug/liter; 28-day LC50 for adults, 1.3 ug/liter. However, the average standard length of juvenile fish was significantly reduced by exposure to 0.08 ug of Kepone/liter of water; some fish developed scoliosis. Concentration factors in juvenile sheepshead minnows averaged 7,200 and increased from 3,600 to 20,000 as exposure concentrations decreased.



77-001686 Hattinck, J. THE EFFECT OF TRICLINE METHANESULPHONATE (MS-222) ON THE MICROHAEMATOCRIT OF FISH BLOOD. J. Fish Biol. 10 (5): 453-455. May 1977. SFA 22(3)

[Dep. Physiol., Med. Sch., Univ. Witwatersrand, Johannesburg, South Africa] The effects of the anaesthetic MS-222, on the microhaematocrit value of freshwater fish have been examined. Blood containing MS-222 showed a higher haematocrit value than blood without the anaesthetic and haemolysis occurred in the former after a variable time depending on the concentration. The results are discussed in relation to previous findings.

77-001687 Hodson, P. V.; Blunt, R. R.; Spry, D. J.; Auster, K. EVALUATION OF EPYTHROCYTE DEITA-AMINO LEVULINIC ACID DEHYDRATASE ACTIVITY AS A SHORT-TERM INDICATOR IN FISH OF A HARMFUL EXPOSURE TO PFAD. J. Fish. Res. Board Can. 34 (4): 501-508. Apr. 1977. In English with French summ. SFA 22(3)

[Dep. Fish. Environ., Can. Cent. Inland Waters, Burlington, ON L7R 4A6, Canada]

77-001688 Hoehn, R. C.; Sizemore, D. R. ACID MINE DRAINAGE (AMD) AND ITS IMPACT ON A SMALL VIRGINIA STREAM. Water Resour. Bull. 13 (1): 153-160. Feb. 1977. SFA 22(3)

[Dep. Civil Eng., VPI & SU, Blacksburg, VA] A study was conducted to 1) chemically characterize three AMD streams entering Chestnut Creek in southwestern Virginia below the town of Galax, Virginia, and 2) to assess the biological and chemical alterations in the creek. Over a six mile reach, the benthic macroinvertebrate population was reduced to zero, the naturally low alkalinity (approximately 25 mg/l) of the stream was reduced to less than 5 mg/l, and the pH was reduced from 7.2 to 6.3. Increased concentration of iron from less than 0.01 mg/l to more than 4.0 mg/l were accompanied by the deposition of a coating of iron hydroxide up to 0.25 in. thick in the stream bed, a phenomenon most likely responsible for the absence of benthic macroinvertebrates. /In situ/ bioassays with bluegill sunfish and one snail species showed that the creek water, after confluence with all the AMD streams, was not toxic in 192 hours to fish, and snails survived 96 hours before they began to die. The undiluted AMD itself was highly toxic.

77-001689 Jackson, G. A. BIOLOGIC HALF-LIFE OF ENDRIN IN CHANNEL CATFISH TISSUES. Bull. Environ. Contam. Toxicol. 16 (5): 505-507. Nov. 1976. SFA 22(3)

[U.S. FWS, Southeast. Fish Cult. Lab., Marion, AL 36756]

77-001690 Jacobi, G. Z. CONTAINERS FOR OBSERVING MORTALITY OF BENTHIC MACROINVERTEBRATES DURING ANTIMYCIN TREATMENT OF A STREAM. Prog. Fish-Cult. 39 (2): 103-104. Apr. 1977. SFA 22(3)

[Coll. Nat. Resour., Univ. Wis., Stevens Point 54481]

77-001691 Kearney, P. C.; Isensee, A. R.; Kontson, A. DISTRIBUTION AND DEGRADATION OF DINITROANILINE HERBICIDES IN AN AQUATIC ECOSYSTEM. Pestic. Biochem. Physiol. 7 (3): 242-248. June 1977. SFA 22(3)

[USDA, Agric. Res. Serv., Beltsville, MD 20705]

77-001692 Kim, J. H.; Birks, E.; Heisinger, J. F. PROTECTIVE ACTION OF SELENIUM AGAINST MERCURY IN NORTHERN CREEK CHUBS. Bull. Environ. Contam. Toxicol. 17 (2): 132-136. Feb. 1977. SFA 22(3)
[Biol. Dep., Univ. S. Dak., Vermillion 57069] We found selenium dioxide an effective antagonist to the toxic effects of mercuric chloride in the northern creek chub /*Semotilus atromaculatus*/. Selenium pretreatment increased the whole body accumulation of mercury at lower environmental Hg concentrations. It decreased mercury accumulation in survivors at higher, acutely toxic concentrations.

77-001693 Koeller, P.; Parsons, T. R. THE GROWTH OF YOUNG SALMONIDS (/ONCORHYNCHUS KETA/): CONTROLLED ECOSYSTEM POLLUTION EXPERIMENT. Bull. Mar. Sci. 27 (1): 114-118. Jan. 1977. SFA 22(3)
[Inst. Oceanogr., Univ. British Columbia, Vancouver, BC, Canada] The growth of juvenile chum salmon (/Oncorhynchus keta/) in full-scale (1,700 m³) controlled ecosystems was followed over a period of 45 days. The controlled ecosystems supported the growth of juvenile salmon when large crustacean zooplankton were present as part of the natural food chain in the enclosures. In the presence of small zooplankton the young salmon were unable to increase in weight. In contrast to the marked effect of diet on the growth of juvenile salmonids, the presence of 2.5 ug/l inorganic copper (10 X ambient level) caused no observable effect on the growth or survival of the fish. These experiments indicate that factors (pollutants or natural events) which alter the spectrum of prey items available to young fish may be more important than the direct effect of physical or chemical factors on juvenile fish.

77-001694 Koli, A. K.; Williams, W. R.; McClary, E. B.; Wright, E. L.; Burrell, T. M. MERCURY LEVELS IN FRESHWATER FISH OF THE STATE OF SOUTH CAROLINA. Bull. Environ. Contam. Toxicol. 17 (1): 82-89. Jan. 1977. SFA 22(3)
[Dep. Nat. Sci., S. Car. State Coll., Orangeburg 29117] A significant finding of this report is that those species for which fish of widely differing weights were analyzed, larger fish had higher mercury levels. Mercury levels exceeding the U.S. Food and Drug Administration guideline of 500 pph for fish tissues have been found in the Mudfish from Edisto River and Pike fish from Lake Murray. Higher levels of mercury occurred in the highly vascularized blood tissues of liver and kidney than in muscle. Carnivorous and bottom-feeding fishes are the most reliable indicators of mercury pollution.-From summ.

77-001695 Krzeminski, S. F.; Gilbert, J. T.; Pitts, J. A. A PHARMACOKINETIC MODEL FOR PREDICTING PESTICIDE RESIDUES IN FISH. Arch. Environ. Contam. Toxicol. 5 (2): 157-166. 1977. SFA 22(3)
[Rohm and Haas Co., Res. Lab., Spring House, PA 19477]

77-001696 Kulikov, N. V.; Ozhegov, L. N. ACCUMULATION OF ⁹⁰SR-⁹⁰Y BY DEVELOPING EGGS AND LARVAE OF WHITEFISH /COREGONUS LAVAPETUS/ L. Sov. J. Ecol. (Engl. Transl. Ekologiya). 7 (2): 175-177. Mar.-Apr. 1976. SFA 22(3)
[Urals Sci. Cent., Acad. Sci., USSR]

77-001697 Larson, D. W. ENHANCEMENT OF METHYLMERCURY UPTAKE IN FISH BY LAKE TEMPERATURE, PH, AND DISSOLVED OXYGEN GRADIENTS: HYPOTHESIS. Northwest Sci. 51 (2): 131-137. May 1977. SPA 22(3)

[U.S. Army Corps Eng., Portland, OR 97208] Mercury analyses of fish tissue from two Oregon, U.S.A., lakes showed higher mercury concentrations in fish from a "eutrophic" lake than in fish from an adjacent "oligotrophic" type. This finding was attributed to differences between lakes regarding certain physical-chemical vertical gradients. In summer, the eutrophic lake developed thermal, pH, and dissolved oxygen conditions which may have contributed to higher rates of methylmercury uptake in fish. Conversely, fish in the oligotrophic lake were not subjected to these conditions, and consequently accumulated less mercury.

77-001698 Lewis, F. G. III; Livingston, R. J. AVOIDANCE OF BLEACHED KRAFT PULPMILL EFFLUENT BY PINFISH (*LAGODON RHOMBOIDES*) AND GULF KILLIFISH (*FUNDULUS GRANDIS*). J. Fish. Res. Board Can. 34 (4): 568-570. Apr. 1977. In English with French summ. SPA 22(3)
[Dep. Biol., Fla. State Univ. Tallahassee 32306]

77-001699 Lockhart, W. L.; Metner, D. A.; Solomon, J. METHOXYCHLOR RESIDUE STUDIES IN CAGED AND WILD FISH FROM THE ATHABASCA RIVER, ALBERTA, FOLLOWING A SINGLE APPLICATION OF BLACKFLY LARVICIDE. J. Fish. Res. Board Can. 34 (5): 626-632. May 1977. In English with French summ. SPA 22(3)
[Fish. Mar. Serv., Freshwater Inst., Winnipeg, MB R3T 2N6, Canada]

77-001700 Lorz, H. W.; McPherson, R. P. EFFECTS OF COPPER ON SEAWATER ADAPTATION AND MIGRATION OF COHO SALMON (*ONCORHYNCHUS KISUTCH*). Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 255-266. July 1975. SPA 22(3)

[Dep. Fish Wildl., Corvallis, OR] The static 96-h LC-50 of coho smolts (28-56 g) exposed to copper was approximately 57 ug/l in freshwater (pH 6.8-7.6, hardness and alkalinity of 89-95 and 58-65 ppm as CaCO₃ respectively). When fish surviving exposures to >50 ug/l copper were transferred immediately to seawater (30 ‰), total mortality occurred. All fish survived a 144-hour exposure to 20 or 30 ug/l copper in freshwater but at least 60 percent died during a 14-day exposure to seawater. Gill microsomal Na⁺, K⁺-stimulated ATPase activity declined with increasing copper concentrations. No adverse changes were noted for ATPase activity and seawater adaptation for fish exposed for 144 hours to zinc concentrations <2500 ug/l in freshwater. Juvenile coho were also exposed in a continuous freshwater flow system to four copper concentrations (0, 5, 10, 20 and 30 ug/l) from 144 to more than 4000 hours. Groups of fish exposed to copper for 144, 2700, or 4128 hours in freshwater have all shown comparable levels of seawater survival and enzyme activity at any given concentration. At 0 and 5 ug/l few fish died in seawater but mortalities of 50 percent or greater have been noted in coho exposed to copper concentrations of 20 and 30 ug/l. The lowest food intake and poorest growth occurred in fish being reared in 30 ug/l copper. Coho salmon given a 120-hour "rest" (non-toxicant exposure in freshwater) following toxicant exposure showed somewhat higher survival when transferred to seawater than their counterparts which were transferred immediately. However, juveniles that were given a 15-day "rest" showed survival almost equivalent to the controls in seawater. Coho receiving the lowest copper exposures (0-10 ug/l) in both the acute and chronic groups have exhibited better downstream movement than 20 and 30 ug/l groups upon release into a small coastal stream.

77-001701 Luoma, S. N. DETECTION OF TRACE CONTAMINANT EFFECTS IN AQUATIC ECOSYSTEMS. J. Fish. Res. Board Can. 34 (3): 436-439. Mar. 1977. In English with French summ. SFA 22(3)
[U.S.G.S., Menlo Park, CA 94025]

77-001702 MacInnes, J. R.; Thurberg, F. P.; Greig, R. A.; Gould, F. LONG-TERM CADMIUM STRESS IN THE CUNNER, /TAUTOGOLABRUS ADSPERSUS/. NOAA Fish. Bull. 75 (1): 199-203. Jan. 1977. SFA 22(3)
[NMFS, Middle Atl. Coast. Fish. Cent., Milford, CT 06460] The cunner, /Tautogolabrus adspersus/, was exposed for 30 and 60 days to 0.05 or 0.10 ppm Cd as cadmium chloride. The mean gill-tissue respiratory rates exhibited by the control fish and those exposed to 0.05 and 0.10 ppm Cd were 972, 736, and 665 $\mu\text{l O}_2$ /h/g dry weight, respectively, after 30 days and 1,036, 702, and 587 $\mu\text{l O}_2$ /h/g, respectively after 60 days. Changes were also observed in the activities of two liver enzymes, aspartate aminotransferase (depression) and glucose-6-phosphate dehydrogenase (induction). Results are compared with those from other metal-exposure studies with cunners and other teleosts.

77-001703 Marking, L. L.; Bills, T. D. CHLORINE: ITS TOXICITY TO FISH AND DETOXIFICATION OF ANTIMYCIN. U.S. Fish Wildl. Serv. Invest. Fish Control 74. 5p. 1977. SFA 22(3)

[U.S. FWS, Fish Control Lab., La Crosse, WI] The 96-h LC_{50} 's for chlorine ranged from 0.156 mg/l for channel catfish (/Ictalurus punctatus/) to 1.41 mg/l for black bullheads (/A. melas/) in standardized laboratory tests. The toxicity of chlorine was influenced little by pH, temperature, or water hardness. Chlorine at 0.25 and 0.5 mg/l effectively detoxified antimycin. The half-life of biological activity for antimycin with chlorine ranged from 1.1 h at pH 6.5 to 1.5 h at pH 9.5. Chlorine readily detoxified antimycin at pH 6.5, 7.5, and 8.5, but not at pH 9.5.

77-001704 Marking, L. L.; Bills, T. D.; Chandler, J. H., Jr. TOXICITY OF FURANACE TO FISH, AQUATIC INVERTEBRATES, AND FROG EGGS AND LARVAE. U.S. Fish Wildl. Serv. Invest. Fish Control 76. 6p. 1977. SFA 22(3)

[U.S. FWS, Fish Control Lab., La Crosse, WI] Furanace (6-hydroxymethyl-2f-2-(5-nitro-2-furyl)vinylpyridine), a nitrofuran originally designated as furpirinol, nifurpirinol, or P-7139, is effective against certain bacterial infections in fish, especially myxobacteriosis. The toxicity of the drug to fish, frog eggs and larvae, and aquatic invertebrates was determined in standardized laboratory toxicity tests and in use pattern exposures. Additional tests were conducted in aged solutions of Furanace to determine the persistence in water. This research was done to broaden existing toxicity data and to help fulfill drug registration requirements. Furanace was not toxic to any test species in use pattern exposures of 1 mg/l for 1 h daily for up to three treatments. In 96-h exposures, LC_{50} 's ranged from 0.820 to 3.00 mg/l for six species of fish and from 1.13 to 20 mg/l for six species of invertebrates, and was 0.770 mg/l for larvae of the leopard frog (/Rana pipiens/). Toxicity increased with elevated temperatures in tests with rainbow trout (/Salmo gairdneri/), channel catfish (/Ictalurus punctatus/), and green sunfish (/Lepomis cyanellus/). Increased water hardness and pH decreased toxicity to rainbow trout, but did not influence toxicity to channel catfish and green sunfish.

77-001705 Matthiessen, P.; Brafield, A. E. UPTAKE AND LOSS OF DISSOLVED ZINC BY THE STICKLEBACK /GASTEROSTEUS ACULEATUS/ L. J. Fish Biol. 10 (4): 399-410. Apr. 1977. SFA 22(3)

[Cent. Overseas Pest Res., 56 Gray's Inn Road, London WC1X 8LU, England] Uptake and loss by sticklebacks of both stable zinc and ^{65}Zn in hard and soft water have been studied for periods of up to 400 h. In calcium-free water, the ^{65}Zn uptake curve is approximately asymptotic over a period of 24 h, while in hard water internal ^{65}Zn levels are dropping at 24 h. Over 5 h, however, fish in hard tapwater absorb about 3.5 times more ^{65}Zn than those in calcium-free water. There is a positive linear relationship between log ^{65}Zn uptake and log wet weight of fish. Whole-body concentration factors (c.f.) at 16 h reach a maximum of 12.2 (mean = 2.9), highest concentrations of ^{65}Zn being found in the gills (mean c.f. = 5.1) and lowest concentrations in the gonads (mean c.f. = 0.8). Over longer periods (400 h), internal stable zinc levels of fish exposed to 1 and 4 p.p.m. Zn^{2+} remain little higher (max 28 percent) controls. ^{65}Zn efflux into zinc-free water falls to zero after 5 h, more zinc (78 percent) being lost after uptake in tapwater than in calcium-free water (56 percent).

77-001706 Mauck, W. L.; Mayer, F. L., Jr.; Holz, D. D. SIMAZINE RESIDUE DYNAMICS IN SMALL PONDS. Bull. Environ. Contam. Toxicol. 16 (1): 1-8. July 1976. SFA 22(3)

[U.S. FWS, P.O. Box 936, La Crosse, WI 54601] The use of simazine as a pre-emergent herbicide for aquatic vegetation control has excellent possibilities in fishery management for manipulation of vegetative cover. No harmful effects resulting from chemical persistence were observed during the 2 years of testing.--From discussion.

77-001707 Maylin, G. A.; Henion, J. D.; Hicks, J. J.; Leibovitz, L.; Ahrens, V. D.; Gilbert, M.; Lisk, D. J. TOXICITY TO FISH OF FLAME RETARDANT FABRICS IMMERSSED IN THEIR WATER. PART I. Bull. Environ. Contam. Toxicol. 17 (4): 499-504. Apr. 1977. SFA 22(3)

[Dep. Vet. Pathol., Cornell Univ., Ithaca, NY 14853] A number of commercial and candidate flame retardants were studied with regard to their toxicity to fish when released from fabrics immersed in their water. Immersion of laundered or unlaundered flame retardant 100 percent polyester or polyester blend fabrics used in children's sleepwear in water containing goldfish resulted in release of the anticholinesterase flame retardant TDBPP (tris(2,3-dibromopropyl) phosphate) and death of all fish within 24 hours. TDBPP undergoes loss of HBr in water and production of a metabolite.

77-001708 Meldrim, J. W.; Fava, J. A., Jr. BEHAVIORAL AVOIDANCE RESPONSES OF ESTUARINE FISHES TO CHLORINE. Chesapeake Sci. 18 (1): 154-157. Mar. 1977. SFA 22(3)

[Ichthyological Assoc., Inc., 100 South Cass St., Middletown, DE 19709]

77-001709 Merlini, M.; Pozzi, G. LEAD AND FRESHWATER FISHES: PART I--LEAD ACCUMULATION AND WATER PH. Environ. Pollut. 12 (3): 167-172. Mar. 1977. SFA 22(3)

[J. D. Pes. Sci. Educ. C.E.C. Furatoni J.P.C., 21020 Ispra, Italy] The accumulation of lead by an edible freshwater fish was investigated at pH 7.5 and pH 6.0. At the lower pH the fish concentrated almost three times more lead than at the higher pH. The sites of lead concentration, however, were not altered by the change in water pH.

77-001710 Middaugh, D. P.; Couch, J. A.; Crane, A. M. RESPONSES OF EARLY LIFE HISTORY STAGES OF THE STRIPED BASS, /MORONE SAXATILIS/ TO CHLORINATION. Chesapeake Sci. 18 (1): 141-153. Mar. 1977. SFA 22(3)

[U.S. EPA, P.O. Box 368, John's Island, SC 29455] Beginning 8 to 9 hours after fertilization, developing embryos were exposed continuously to total residual chlorination (TRC) in flowing water at 1.0-3.0 ppt salinity and 18 ± 1 C. Fifty-six percent of the control group (no TRC exposure) hatched. None of the embryos exposed to a measured TRC concentration of 0.21 mg/l hatched. Only 3.5 percent of the embryos exposed to 0.07 mg/l TRC and 23 percent of those exposed to 0.01 mg/l TRC hatched. Incipient LC50 bioassays were used to determine the sensitivity of 2-, 12- and 30-day-old striped bass to concentrations of TRC in flowing water (1.0-3.0 ppt salinity at 18 ± 1 C). The estimated incipient LC50 was 0.04 mg/l TRC for 2-day-old prolarvae, 0.07 mg/l for 12-day-old larvae and 0.04 mg/l for 30-day-old juveniles. Histological examination of 30-day-old juveniles which survived exposure in the incipient LC50 bioassay indicated gill and pseudobranch damage for fish exposed to 0.21 to 2.36 mg/l TRC. Statistical analysis of avoidance tests conducted at 1.0-3.0 ppt salinity and 18 ± 1 C with 24-day-old larvae showed significant (X^2 , p less than 0.05) and reproducible avoidance responses to measured TRC concentrations of 0.79-0.82 mg/l and 0.29-0.32 mg/l. No avoidance was indicated at TRC concentrations of 0.16-0.18 mg/l.--From abstr.

77-001711 Miller, D. W. FACTORS AFFECTING UPTAKE AND RETENTION OF MANGANESE-54 IN FISH. Ph.D. dissertation, Purdue Univ. 127 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001712 Mudge, J. E.; Dively, J. L.; Neff, W. H.; Anthony, A. INTERRENAL HISTOCHEMISTRY OF ACID-EXPOSED BROOK TROUT, /SAVELINUS FONTINALIS/ (MITCHILL). Gen. Comp. Endocrinol. 31 (2): 208-215. Feb. 1977. SFA 22(3)

[Metropolitan Edison Co., P.O. Box 542, Reading, PA] Acute exposure of brook trout to acid water (pH 4.0) caused a significant decrease in interrenal (adrenocortical cell) nuclear diameter, concomitant with an increase in the intensity of nuclear staining. Cytochemical analyses of Feulgen-DNA (F-DNA) of interrenal cell nuclei revealed these cells to be diploid (2C) and nonreplicating. There was no loss in DNA evidenced in interrenal nuclei of acid-stressed trout. In the same fish, there appeared to be a progressive decrease in azure-B-RNA levels measured cytophotometrically over a 3- to 24-hr-exposure interval. A marked but transient elevation in circulating cortisol levels occurred at 1-3 hr of exposure with a return to control levels after 24 hr of exposure. No visually discernible changes in Sudan black B staining for lipids were evidenced after acute acid exposure. The findings support the conclusion that there is a marked inhibition of RNA synthesis and presumably of steroidogenesis in interrenal tissue following acute exposure of trout to low pH.

77-001713 Ogilvie, D. M.; Miller, D. L. DURATION OF A DDT-INDUCED SHIFT IN THE SELECTED TEMPERATURE OF ATLANTIC SALMON (/SALMO SALAR/). Bull. Environ. Contam. Toxicol. 16 (1): 86-89. July 1976. SFA 22(3)

[Dep. Zool., Univ. West. Ontario, London, ON N6A 3K1, Canada] Control salmon exposed to acetone-containing water for 24 hours had a mean selected temperature of 19.1°C , whereas fish that had been similarly exposed to 50 ppb DDT had a mean selected temperature of 23.4°C . This DDT-induced upward shift in selected temperature is highly significant (P less than 0.01).--From results and discuss.

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77-001714 Parejko, R.; Wu, C. J. CHLOROHYDROCARBONS IN MARQUETTE FISH HATCHERY LAKE TROUT (*/SALVELINUS NAMAYCUSH/*). Bull. Environ. Contam. Toxicol. 17 (1): 90-97. Jan. 1977. SFA 22(3)
[Dep. Biol., North. Mich. Univ., Marquette 49855]

77-001715 Perrone, S. J.; Meade, T. L. PROTECTIVE EFFECT OF CHLORIDE ON NITRITE TOXICITY TO COHO SALMON (*/ONCORHYNCHUS KISUTCH/*). J. Fish. Res. Board Can. 34 (4): 486-492. Apr. 1977. In English with French summ. SFA 22(3)
[Dep. Anim. Sci., Coll. Res. Dev., Univ. R.I., Kingston 02881]

77-001716 Plumb, J. A.; Richburg, R. W. PESTICIDE LEVELS IN SERA OF MORIBUND CHANNEL CATFISH FROM A CONTINUOUS WINTER MORTALITY. Trans. Am. Fish. Soc. 106 (2): 185-188. Mar. 1977. SFA 22(3)
[Dep. Fish. Allied Aquacult., Auburn Univ., Auburn, AL 36830]

77-001717 Roales, R. R.; Perlmutter, A. THE EFFECTS OF SUB-LETHAL DOSES OF METHYLMERCURY AND COPPER, APPLIED SINGLY AND JOINTLY, ON THE IMMUNE RESPONSE OF THE BLUE GOURAMI (*/TRICHOGASTER TRICHOPTEPUS/*) TO VIRAL AND BACTERIAL ANTIGENS. Arch. Environ. Contam. Toxicol. 5 (3): 325-331. 1977. SFA 22(3)

[Div. Biol. Phys. Sci., Indiana Univ. Kokomo, 2300 S. Washington St., Kokomo 46901] The exposure of blue gouramis to 9 ppb of methylmercury, copper, or methylmercury + copper resulted in an apparent decrease in the immune response of these fish to both infectious pancreatic necrosis (IPN) virus and */Proteus vulgaris/*. The two toxicants jointly, however, produced no greater or lesser effect than when each compound was applied singly.--From abstr.

77-001718 Sandhu, S. S. STUDY ON THE POST-MORTEM IDENTIFICATION OF POLLUTANTS IN THE FISH KILLED BY WATER POLLUTION: DETECTION OF ARSENIC. Bull. Environ. Contam. Toxicol. 17 (3): 373-378. Mar. 1977. SFA 22(3)

[Water Lab., S. Car. State Coll., Orangeburg 29117]

77-001719 Scheier, A.; Gominger, D. A PRELIMINARY STUDY OF THE TOXIC EFFECTS OF IRRADIATED VS. NON-IRRADIATED WATER SOLUBLE FRACTIONS OF NO. 2 FUEL OIL. Bull. Environ. Contam. Toxicol. 16 (5): 595-603. Nov. 1976. SFA 22(3)

[Acad. Nat. Sci. Phila., Philadelphia, PA 19103]

77-001720 Schimmel, S. C.; Wilson, A. J., Jr. ACUTE TOXICITY OF KEPONE TO FOUR ESTUARINE ANIMALS. Chesapeake Sci. 18 (2): 224-227. June 1977. SFA 22(3)

[U.S. EPA, Environ. Res. Lab., Gulf Breeze, FL 32561] Recent contamination of the James River estuary, Virginia, with Kepone prompted acute flow-through bioassays to determine the 96-hour toxicity of the insecticide to four estuarine species native to that ecosystem. The species and their 96-hour LC50 values were: grass shrimp (*/Palaemonetes pugio/*), 121 ug/liter; blue crab (*/Callinectes sapidus/*), greater than 2100 ug/liter; sheepshead minnow (*/Cyprinodon variegatus/*), 69.5 ug/liter; and spot (*/Leiostomus xanthurus/*) 4.6 ug/liter. Surviving animals were analyzed for Kepone. Average bioconcentration factors (the concentration of Kepone in tissues divided by the concentration of Kepone measured in seawater) were: grass shrimp, 698; blue crab 8.1; sheepshead minnow, 1,548; and spot,

SPORT FISHERY ABSTRACTS

77-001720 CONTINUED
1, 221.

77-001721 Shannon, L. P. EQUILIBRIUM BETWEEN UPTAKE AND ELIMINATION OF DIELDRIN BY CHANNEL CATFISH, *ICTALURUS PUNCTATUS*/. Bull. Environ. Contam. Toxicol. 17 (3): 278-283. Mar. 1977. SFA 22(3)

[11 Sci. Hall II, Iowa State Univ., Ames 50011] Channel catfish, *Ictalurus punctatus*/, measuring 150 (± 5) mm were exposed continuously to dieldrin for 70 days to determine if equilibrium between dieldrin uptake and elimination was reached by muscle tissue. Fish exposed to 13 parts per trillion (pptr) dieldrin reached equilibrium in 56 days, fish exposed to 27 pptr dieldrin were near equilibrium after 56 days, and fish exposed to 49 pptr dieldrin did not reach a balance between uptake and elimination after 70 days of exposure. Evidence of this study showed that balance between uptake and elimination was reached in less time at lower exposure levels than at higher levels.

77-001722 Shultz, C. D.; Crear, D. THE DISTRIBUTION OF TOTAL AND ORGANIC MERCURY IN SEVEN TISSUES OF THE PACIFIC BLUE MARLIN, *MAKAIRA NIGRICANS*/. Pac. Sci. 30 (2): 101-107. Apr. 1976. SFA 22(3)

[D. Crear: Hawaii Inst. Mar. Biol., P.O. Box 1346, Kaneohe 96744] Tissue samples from Pacific blue marlin (*Makaira nigricans*/) were collected at a fishing tournament in Kona, Hawaii, in August 1973. Analyses of total and organic (methyl) mercury indicated that the marlin may be biotransforming methyl mercury to inorganic mercury such that about 90 percent of the body burden of mercury is in the inorganic form. Specific analysis of a subsample of the tissues showed that the difference between the total and organic mercury concentrations was equal to inorganic mercury by weight.

77-001723 Sigmon, C. F.; Kania, H. J.; Beyers, R. J. REDUCTIONS IN BIOMASS AND DIVERSITY RESULTING FROM EXPOSURE TO MERCURY IN ARTIFICIAL STREAMS. J. Fish. Res. Board Can. 34 (4): 493-500. Apr. 1977. In English with French summ. SFA 22(3)

[Zool. Dep., Clemson Univ., Clemson, SC 29631]

77-001724 Smit, G. L.; Hattings, J.; Schoonbee, H. J. OBSERVATIONS ON SOME EFFECTS OF DISODIUM ETHYLENEDIAMINE TETRA-ACETATE AND HEPARIN ON FISH BLOOD. Comp. Biochem. Physiol. C Comp. Pharmacol. 57 (1): 35-38. 1977. SFA 22(3)

[Dep. Zool., Rand Afrikaans Univ., P.O. Box 524, Johannesburg, South Africa, 2000] Heparin in NaCl solution, containing 0.15 percent chlorocresol as preservative and disodium ethyldiamine tetra-acetate (EDTA) powder (dissolved in deionized water), were compared as anticoagulants for the determination of pH, pCO(2), pO(2) and haematocrit values immediately upon withdrawal and after certain time intervals in the blood of the freshwater fish, *Cyprinus carpio*/. All concentrations of EDTA investigated caused drastic changes in pH, pCO(2), pO(2) and haematocrit values of blood whereas heparin produced few significant effects. Possible reasons for the observed effects are discussed. It is again stressed that preliminary experiments must be done to examine the effects of anticoagulants prior to routine haematological investigations.

SPORT FISHERY ABSTRACTS

77-001725 Smith, A. D.; Butler, J. R.; Ozburn, G. W. A PNEUMATIC DOSING APPARATUS FOR FLOW-THROUGH BIOASSAYS. Water Res. 11 (4): 347-349. 1977. SFA 22(3)

[Dep. Biol., Lakehead Univ., Thunder Bay, ON, Canada] A multichannel pneumatic injector, when used with an equal-volume diluter, possesses several advantages over the mechanical approach to toxicant dosing. The system is reliable and highly versatile, capable of maintaining an unlimited range of toxicant levels in flow-through bioassays. Use of a single toxicant concentration eliminates the necessity of preparing several stock solutions. Automatic reloading of the injector syringes reduces maintenance.

77-001726 Soivio, A.; Nyholm, K.; Huhti, M. EFFECTS OF ANAESTHESIA WITH MS 222, NEUTRALIZED MS 222 AND BENZOCAINE ON THE BLOOD CONSTITUENTS OF RAINBOW TROUT, /SALMO GAIARDNERI/. J. Fish Biol. 10 (1): 91-101. Jan. 1977. SFA 22(3)

[Dep. Zool., Univ. Helsinki, Arkadiankatu 7, SF-00100 Helsinki 10, Finland] Rainbow trout (/Salmo gairdneri/ Richardson) were subjected to 15 min anaesthesia with unbuffered MS 222, neutralized MS 222 and benzocaine with and without physical stress. Blood samples were taken through cannulae inserted into the dorsal aorta. The Hct values and Hb concentrations increased with all the anaesthetics, which also caused swelling of erythrocytes. The initial values were restored within 4-12 h of recovery. Each anaesthetic elevated the blood lactate concentration, but the initial level was regained within 12 h. The blood glucose level decreased the most during anaesthesia with unbuffered MS 222, but the initial level was rapidly restored. Benzocaine caused the least hypoglycaemia during anaesthesia, but the subsequent hyperglycaemia, as in the fish anaesthetized with neutralized MS 222, lasted 24 h. Neutralized MS 222 and benzocaine elevated the plasma K⁺ concentration more rapidly than unbuffered MS 222. The initial levels were regained in 4 days. All anaesthetics raised the Mg⁺⁺ concentration. The P(O)₂ in the dorsal aorta decreased during anaesthesia with unbuffered MS 222 by about 86 mmHg, while the P(CO)₂ increased by about 1.5 mmHg. Their initial levels were regained within 20 min. During anaesthesia the pH value decreased by 0.3 units and returned to the initial value within 2-4 h of recovery. MS 222 seemed to be an asphyxiant.

77-001727 Speranza, A. W.; Seeley, R. J.; Seeley, V. A.; Perlmutter, A. THE EFFECT OF SUBLETHAL CONCENTRATIONS OF ZINC ON REPRODUCTION IN THE ZEBRAFISH, /BRACHYDANIO RERIO/ HAMILTON-BUCHANAN. Environ. Pollut. 12 (3): 217-222. Mar. 1977. SFA 22(3)

[Lab. Aquatic Biol., N.Y. Univ., New York 10003] Adult zebrafish, when held in water containing a threshold concentration (5 ppm) of zinc for a 9-day period in which the gametes were maturing, showed a delay in spawning. When spawning did occur, the experimental pairs of fish produced an average of 165 eggs of which only 21.1 percent were viable. In contrast, control pairs of fish produced an average of 434 eggs of which 90.2 percent were viable. In addition, survival of the eggs to hatching was significantly lower than in controls, the survival rate for the experimentals being 0.9 percent, that of the controls, 63.3 percent. The adverse effects on zebrafish of exposure to zinc can be reversed by returning the fish to a zinc-free environment.

- 77-001728 Struhsaker, J. W. EFFECTS OF BENZENE (A TOXIC COMPONENT OF PETROLEUM) ON SPAWNING PACIFIC HERRING, *CLUPEA HARENGUS PALLASI*/. NOAA Fish. Bull. 75 (1): 43-49. Jan. 1977. SFA 22(3)
[NMFS, Southwest Fish. Cent., 3150 Paradise Dr., Tiburon, CA 94920]
When female Pacific herring were exposed to low (parts per billion) levels of benzene for 48 h just prior to their spawning, a significant reduction occurred in survival of ovarian eggs and resultant embryos and larvae through yolk absorption. The reduction in survival of ovarian eggs was approximately 10-25 percent, for embryos from fertilization to hatching, 26 percent, and for embryos and larvae through yolk absorption, 43 percent. Exposure to benzene also induced premature spawning and resulted in aberrant swimming behavior and disequilibrium in adults of both sexes. Conservatively estimating the total reduction in survival in these experiments to be approximately 50 percent through yolk absorption, I surmise that the effect of exposing spawning herring to only one toxic component of petroleum could have a significant effect on the population. The fish in these experiments were exposed to relatively high parts per billion levels, but they were exposed for a relatively short period (48 h); it is probable that in the estuary, if chronically exposed over a longer period of time to low parts per billion levels of aromatic components, the populations could be seriously affected. When the spawning female herring is compared with other life history stages, we find that the spawning stage is clearly the most sensitive of those tested. If fishes prove generally to be most sensitive to petroleum components during their spawning seasons, fishery management decisions should take this factor into consideration in protecting the resources.--From abstr.
- 77-001729 Trojnar, J. R. EGG AND LARVAL SURVIVAL OF WHITE SUCKERS (*CATOSTOMUS COMMERSONI*.) AT LOW PH. J. Fish. Res. Board Can. 34 (2): 262-266. Feb. 1977. In English with French summ. SFA 22(3)
[Dep. Nat. Resour., Cornell Univ., Ithaca, NY 14853]
- 77-001730 Trojnar, J. R. EGG HATCHABILITY AND TOLERANCE OF BROOK TROUT (*SALVELINUS FONTINALIS*.) FRY AT LOW PH. J. Fish. Res. Board Can. 34 (4): 574-579. Apr. 1977. In English with French summ. SFA 22(3)
[Dep. Nat. Resour., Cornell Univ, Ithaca, NY 14853]
- 77-001731 Vigers, G. A.; Maynard, A. W. THE RESIDUAL OXYGEN BIOASSAY: A RAPID PROCEDURE TO PREDICT EFFLUENT TOXICITY TO RAINBOW TROUT. Water Res. 11 (4): 343-346. 1977. SFA 22(3)
[E.V.S. Consultants Ltd., 204 Blue Mountain St., Coquitlam, BC, Canada] A rapid bioassay procedure is described which for the toxic effluents tested, is sensitive to concentrations in the 96-h LC(50) range. The procedure requires less than eight hours to complete and is based on the consumption of available oxygen by fish in sealed containers. The procedure was evaluated using sodium pentachlorophenate, 3 kraft pulp mill bleach plant effluents and a chloralkali plant waste. The threshold concentrations obtained from the rapid procedure were directly comparable to 96-h LC(50) values obtained by standard methods. For replicate tests with sodium pentachlorophenate, no significant difference (/p/ less than 0.05) between means of data obtained by the two bioassay procedures could be demonstrated, using the Student "t"-test.

77-001732 Von Westernhagen, H.; Dethlefsen, V. COMBINED EFFECTS OF CADMIUM AND SALINITY ON DEVELOPMENT AND SURVIVAL OF FLOUNDER EGGS. J. Mar. Biol. Assoc. U.K. 55 (4): 945-957. Nov. 1975. SFA 22(3)

[Biol. Anst. Helgoland, Hamburg, West Germany] Eggs of Baltic flounder (*Pleuronectes flesus*) were incubated in cadmium contaminated sea water (0, 0.1, 0.5, 1.0, 2.0, 3.0, 5.0 ppm) at four salinities (16, 25, 32, 42‰). Effects of cadmium on embryonic survival and viable hatch were not dependent on the salinity of the incubating water. At all salinities hatching rates and viable hatch were not adversely affected by cadmium concentrations of up to 1.0 ppm. 2.0, 3.0 and 5.0 ppm caused marked decrease in hatching rates and viable hatch. Mean total length, eye and otic capsule diameter did not appear to be adversely affected by increasing cadmium concentrations in the rearing medium. Cadmium content of eggs was found to be generally higher in lower salinities than in more saline water of comparable cadmium concentrations.

77-001733 Warlen, S. M.; Wolfe, D. A.; Lewis, C. W.; Colby, D. R. ACCUMULATION AND RETENTION OF DIETARY ^{14}C -DDT BY ATLANTIC MENHADEN. Trans. Am. Fish. Soc. 106 (1): 95-104. Jan. 1977. SFA 22(3)

[NMFS, Atl. Estuarine Fish. Cent., Beaufort, NC 28516]

77-001734 Whittle, D. W.; Flood, K. W. ASSESSMENT OF THE ACUTE TOXICITY, GROWTH IMPAIRMENT, AND FLESH TAINTING POTENTIAL OF A BLEACHED KRAFT MILL EFFLUENT ON RAINBOW TROUT (*SALMO GAIRDNERI*). J. Fish. Res. Board Can. 34 (6): 869-878. June 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Great Lakes Biolimnol. Lab., Burlington, ON L7R 4A6, Canada]

77-001735 Wright, D. A. TOXICITY OF FLUORIDE TO BROWN TROUT FRY (*SALMO TRUTTA*). Environ. Pollut. 12 (1): 57-62. Jan. 1977. SFA 22(3)

[Dep. Zool., The University, Newcastle upon Tyne, NE1 7RU, England] The toxicity of fluoride to brown trout fry (*Salmo trutta*) was tested using groups of 100 animals in tapwater containing 26 ppm calcium with sodium fluoride added. Results obtained were similar to published work on *S. gairdnerii* although, taking into account the 'calcium effect', it appears that the animals used in this investigation may be more sensitive.

77-001736 Zitko, V. THE ACCUMULATION OF POLYBROMINATED BIPHENYLS BY FISH. Bull. Environ. Contam. Toxicol. 17 (3): 285-292. Mar. 1977. SFA 22(3)

[Environ. Can., Biol. Stn., St. Andrews, NB B0G 2X0, Canada] The accumulation of commercial polybrominated biphenyl (PBB) preparations, BP-6 (Michigan Chemical Corporation) and OB (The Dow Chemical Company), from water and from food by juvenile Atlantic salmon (*Salmo salar*) was determined and compared with that of Aroclor 1254. Only bromobiphenyls with six or fewer bromine atoms were accumulated from water by the fish. When administered in food, more brominated biphenyls were taken up as well. The accumulation coefficients decreased markedly with increasing number of bromine atoms in the bromobiphenyls. Several partially debrominated biphenyls were detected in the fish.

77-001737 Zitko, V.; McTeese, D. W.; Carson, F. G.; Welch, H. F. TOXICITY OF ALKYLDINITROPHENOLS TO SOME AQUATIC ORGANISMS. Bull. Environ. Contam. Toxicol. 16 (5): 508-515. Nov. 1976. SFA 22(3)
[Environ. Can., Biol. Stn., St. Andrews, NB B0G 2Y0, Canada] The toxicity of alkyl dinitrophenols to juvenile Atlantic salmon increases with increasing octanol-water partition coefficient of these compounds. Some alkyl dinitrophenols are extremely toxic to juvenile Atlantic salmon, larvae and adult lobsters, but comparatively nontoxic to crayfish. The unexpected low toxicity of dinoseb to crayfish is interesting also from the point of structure-activity relations and emphasizes the need of testing these in different species of aquatic fauna.--From concl.

77-001738 Zitko, V.; Futzinger, O. UPTAKE OF CHLORO- AND BROMOBIPHENYLS, HEXACHLORO- AND HEXABROMOBENZENE BY FISH. Bull. Environ. Contam. Toxicol. 16 (6): 665-673. Dec. 1976. SFA 22(3)
[Environ. Can., Fish. Mar. Serv., St. Andrews, NB B0G 2Y0, Canada] The accumulation of di-, tri-, and tetrabromobiphenyls, the corresponding chlorobiphenyls, and of hexabromo- and hexachlorobenzene by juvenile Atlantic salmon (*Salmo salar*) was examined. The accumulation of bromobiphenyls was similar to that of chlorobiphenyls. In contrast to hexachlorobenzene, hexabromobenzene did not accumulate in the fish.--From intro.

FISH TOXICANTS

77-001739 Allen, J. L.; Hunn, J. B. RENAL EXCRETION IN CHANNEL CATFISH FOLLOWING INJECTION OF QUINALDINE SULPHATE OR 3-TRIFLUOROMETHYL-4-NITROPHENOL. J. Fish Biol. 10 (5): 473-479. May 1977. SFA 22(3)

[U.S. FWS, Fish Control Lab., P.O. Box 862, La Crosse, WI 54601] Channel catfish, *Ictalurus punctatus* Rafinesque, injected intraperitoneally with 2-methyl-quinoline sulphate (QASO(4)) or 3-trifluoromethyl-4-nitrophenol (TFM) eliminate most of the dose of these compounds by extra-renal routes. Patterns of renal excretion of Na⁺, K⁺, Ca²⁺, Mg²⁺, and Cl⁻ (mEq kg⁻¹h⁻¹) appeared to be associated with the 'stress' of the urine collection technique rather than with the elimination of either compound. Concentrations of Na⁺, K⁺, Ca²⁺, Mg²⁺, and Cl⁻ (mEq/l) were determined in urine, plasma and gall bladder bile.

77-001740 Dawson, V. K.; Cumming, K. B.; Gilderhus, P. A. EFFICACY OF 3-TRIFLUOROMETHYL-4-NITROPHENOL (TFM), 2',5-DICHLORO-4'-NITROSALICYLANILIDE (BAYER 73), AND A 98:2 MIXTURE AS LARVICIDES IN LABORATORY STUDIES. U.S. Fish Wildl. Serv. Invest. Fish Control 77. 11p. 1977. SFA 22(3)

[U.S. FWS, Fish Control Lab., La Crosse, WI] The larvicidal effects of 3-trifluoromethyl-4-nitrophenol (TFM), 2',5-dichloro-4'-nitrosalicylanilide (Bayer 73), and a 98:2 mixture of the two (TFM:2B) were tested against larvae of the sea lamprey (*Petromyzon marinus*) under controlled laboratory conditions. The larvicides were tested in water at temperatures of 7, 12, and 17 C; total hardnesses of 44, 170, and 300 mg/l as CaCO₃; and pH's of 6.5, 7.5, and 8.5. Temperature had little influence on the toxicity of the larvicides, but the effect of Bayer 73 was slowed in cold water. Water hardness did not significantly influence the activity of the 98:2 mixture. The toxicities of TFM, Bayer 73, and TFM:2B were significantly reduced in water of high pH. Burrowed sea lamprey larvae were less vulnerable to

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TFM, Bayer 73, and TFM:2B than were free-swimming larvae. TFM and TFM:2B were selective for free-swimming lampreys over the nontarget organisms used for comparison, but the margin of safety for nontarget organisms over burrowed sea lampreys was narrow.

77-001741 Gomes, E. D. DETERMINATION OF TOXAPHENE BY BASIC ALCOHOLIC HYDROLYSIS AND FLOPISIL SEPARATION. Bull. Environ. Contam. Toxicol. 17 (4): 456-462. Apr. 1977. SFA 22(3)

[Texas State Dep. Health, 152 E. Stenger, San Benito 78586]

77-001742 Kawatski, J. A.; Zittel, A. F. ACCUMULATION, ELIMINATION, AND BIOTRANSFORMATION OF THE LAMPRICIDE 2',5-DICHLORO-4'-NITROSALICYLANILIDE BY /CHIRONOMUS TENTANS/. U.S. Fish Wildl. Serv. Invest. Fish Control 79. 8p. 1977. SFA 22(3)

[Dep. Biol. Viterbo Coll., La Crosse, WI 54601] When exposed to sublethal concentrations of ¹⁴C-2',5-dichloro-4'-nitrosalicylanilide (Bayer 2353), either alone or in combination with 3-trifluoromethyl-4-nitrophenol (TFM), larvae of the midge (/Chironomus tentans/) accumulated ¹⁴C residue rapidly. Uptake was related directly to amount of toxicant present in exposure water and to water hardness. Residues of ¹⁴C-Bayer 2353 did not attain a stable uptake equilibrium but were rapidly excreted, both during continuous exposure and during postexposure periods in toxicant free water. Chironomids biotransformed ¹⁴C-Bayer 2353 to ¹⁴C-chlorosalicylic acid and an unidentified ¹⁴C metabolite.

77-001743 Maki, A. W.; Johnson, H. E. THE INFLUENCE OF LAMPVAL LAMPRICIDE (TFM: 3-TRIFLUOROMETHYL-4-NITROPHENOL ON GROWTH AND PRODUCTION OF TWO SPECIES OF AQUATIC MACROPHYTES, /FLODEA CANADENSIS/ (MICHX.) PLANCHON AND /MYRIOPHYLLUM SPICATUM/ L. Bull. Environ. Contam. Toxicol. 17 (1): 57-65. Jan. 1977. SFA 22(3)

[Environ. Water Qual. Res. Dep., Proctor & Gamble, Ivorydale Tech. Cent., 5299 Spring Grove Ave., Cincinnati, OH 45217] Interpolation of the present toxicity test data points at 5 and 10.0 mg/l demonstrates that this concentration could be expected to have a slight negative effect on growth and production of /Floodea canadensis/, perhaps bringing about an approximate 5-10 percent reduction in growth rates of exposed plants after a 2 week period. Considering the greater susceptibility of /Myriophyllum spicatum/ this concentration would be expected to bring about a reduction in growth rates and production of exposed plants of the order of 20 percent within two weeks following exposure.--From results and discuss.

77-001744 Maki, A. W.; Johnson, H. E. KINETICS OF LAMPRICIDE (TFM, 3-TRIFLUOROMETHYL-4-NITROPHENOL) RESIDUES IN MODEL STREAM COMMUNITIES. J. Fish. Res. Board Can. 34 (2): 276-281. Feb. 1977. In English with French summ. SFA 22(3)

[Environ. Safety Dep., Proctor and Gamble Co., Ivorydale Tech. Cent., Cincinnati, OH 45217]



SPORT FISHERY ABSTRACTS

77-001745 Sanders, H. O. TOXICITY OF THE MOLLUSCICIDE BAYER 73 AND RESIDUE DYNAMICS OF BAYER 2353 IN AQUATIC INVERTEBRATES. U.S. Fish Wildl. Serv. Invest. Fish Control 78. 7p. 1977. SFA 22(3)
 [U.S. FWS, Fish Pesticide Res. Lab., Rt. 1, Columbia, MO 65201] The molluscicide Bayer 73 (2-aminoethanol salt of 2',5-dichloro-4'-nitrosalicylanilide), a chemical used as a synergist in conjunction with 3-trifluoromethyl-4-nitrophenol (TFM) to control the sea lamprey (*Petromyzon marinus*) in tributaries of the Great Lakes, was tested against five species of crustaceans and two species of aquatic insects: daphnids (*Daphnia magna*), aquatic sowbugs (*Asellus brevicaudus*), scuds (*Gammarus pseudolimnaeus*), glass shrimp (*Palaemonetes kadiakensis*), crayfish (*Orconectes nais*), damselfly nymphs (*Ischnura verticalis*), and midge larvae (*Chironomus plumosus*). The acute toxicities ranged from 48-h EC(50) (median effective concentration causing immobilization) of 0.2 mg/l for daphnids to a 48-h LC(50) (concentration causing 50 percent mortality) of 25 mg/l for crayfish. In daphnids exposed continuously to Bayer 73, reproduction was not impaired at concentrations of 0.018 and 0.032 mg/l, but was significantly (P less than 0.01) reduced at concentrations of 0.056, 0.10, and 0.18 mg/l. Exposure to Bayer concentrations of 0.56, 1.0, and 1.8 mg/l significantly (P less than 0.01) reduced emergence of midges. All organisms exposed to Bayer 2353 (chlorosalicylic acid ring UL ¹⁴C) accumulated radioactive residues in 24 h that ranged from 4 to 80 times (based on wet weight of whole organism) the water concentration of 1.2 ± 0.2 ug/l. Scuds and midge larvae eliminated 90 percent of the residues in 48 h.

77-001746 Schimmel, S. C.; Patrick, J. M., Jr.; Forester, J. UPTAKE AND TOXICITY OF TOXAPHENE IN SEVERAL ESTUARINE ORGANISMS. Arch. Environ. Contam. Toxicol. 5 (3): 353-367. 1977. SFA 22(3)
 [U.S. EPA, Gulf Breeze, FL 32561] Individuals from various ontogenetic stages of longnose killifish (*Fundulus similis*) were exposed to toxaphene for 28 days in flow-through bioassays. Toxaphene was toxic to embryos, fry, juveniles, and adult fish, but fertilization of ova in static tests was not affected by the concentrations tested (0.32 to 10 ug/L). The 28-day measured LC50s for all stages ranged from 0.9 to 1.4 ug/L. Toxaphene was accumulated in ova and other body tissues of the longnose killifish; concentration factors in ova were 1,000 to 5,500, and in whole-body tissues, 4,200 to 60,000.--From abstr.

RESEARCH AND MANAGEMENT-GENERAL

77-001747 Andrews, P. QUALITY FISHING. A CONCEPT FOR ALASKA SPORT FISH MANAGEMENT. Alaska Fish Tales Game Trails 10 (2): 1,16,22. Mar.-Apr. 1977. SFA 22(3)
 [Alaska Dep. Fish Game, Subport Bldg., Juneau 99801]

77-001748 Bassett, B. RESOURCE MANAGEMENT TO INSURE FISHING OPPORTUNITIES--THE VIEW FROM ARIZONA. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 217-221. July 1975. SFA 22(3)
 [Ariz. Game Fish Dep., Phoenix]

SPORT FISHERY ABSTRACTS

77-001749 Byrd, I. B. HOMER SCOTT SWINGLE. JULY 29, 1902 - MAY 20, 1973. J. Mar. Sci. 2 (3): 1-7. 1974. SFA 22(3)
[NMFS, St. Petersburg, FL]

77-001750 Cairns, J., Jr.; Dickson, K. L.; Herricks, F. F., (eds.) RECOVERY AND RESTORATION OF DAMAGED ECOSYSTEMS. Univ. Press Va., Charlottesville. 448p. 1977. Available at \$20 from University Press of Virginia, Box 3608 University Station, Charlottesville, Va. 22903. SFA 22(3)

An experienced group of international scientists contribute case histories, present theories, and raise important questions related to the restoration and recovery of damaged ecosystems. The book focuses on three major topics: the nature of recovery processes for various ecosystems, identification of the elements common to the recovery process for all ecosystems, as well as the unique attributes in different kinds of ecosystems; and the prospects for accelerated recovery and restoration by human intervention and management. Individual chapters discuss the recovery of streams and lakes by natural and artificial methods: the reintroduction of plants and wildlife to damaged ecosystems; the role of fire in the natural growth of forests; environmental factors in surface mine recovery; the effects of oil spills and recovery from them; the recovery of tropical forest systems, tundra, and taiga surfaces; the recovery of cities; and the political problems accompanying environmental legislation.

77-001751 Chasan, D. J. THE BOLDT DECISION--THREE YEARS LATER. Pac. Search 11 (6): 13-14. Apr. 1977. SFA 22(3)

[Pacific Search, 715 Hanison St., Seattle, WA 98109] A popularly written paper on the effects of the decision that half the salmon and steelhead in western Washington belong to the Indians.--RS.

77-001752 Fisheries Research Board of Canada FISHERIES AND AQUATIC SCIENCES IN CANADA: AN OVERVIEW. J. Fish. Res. Board Can. 34 (5): 710-727. May 1977. In English with French summ. SFA 22(3)
[Ottawa, Canada]

77-001753 Fullerton, C. CALIFORNIA'S VIEWS ON THE DIRECTION OF FEDERAL FISH AND WILDLIFE LEGISLATION. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 21-26. July 1975. SFA 22(3)
[Calif. Dep. Fish Game, Sacramento]

77-001754 Holubetz, T. RESOURCE MANAGEMENT TO INSURE FISHING OPPORTUNITIES--THE VIEW FROM IDAHO. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 215-216. July 1976. SFA 22(3)
[Idaho Dep. Fish Game, Boise]

77-001755 Jahn, L. R.; Trefether, J. B. NATIONAL CONSERVATION ORGANIZATION'S VIEWS ON THE DIRECTION OF FEDERAL FISH AND WILDLIFE LEGISLATION. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 27-35. July 1975. SFA 22(3)
[Wildl. Manage. Inst., Washington, DC.]

SPORT FISHERY ABSTRACTS

77-001756 Leggett, R. L. DIRECTIONS OF PAST AND NEW FISH AND WILDLIFE LEGISLATION BY CONGRESS. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 7-20. July 1975. SFA 22(3)

77-001757 Marcoux, R. RESOURCE MANAGEMENT TO INSURE FISHING OPPORTUNITIES--THE VIEW FROM MONTANA. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 222-227. July 1975. SFA 22(3)
[Mont. Game Fish Dep., Missoula]

77-001758 Nikol'skiy, G. V. SOME PROBLEMS OF ICHTHYOLOGY IN RELATION TO THEORETICAL PRINCIPLES FOR INCREASING AQUATIC PRODUCTIVITY. J. Ichthvol. (Engl. Transl. Vopr. Ikhtirol.) 16 (2): 183-190. 1976. SFA 22(3)
[USSR Acad. Sci., Ichthyol. Comm., Moscow, USSR]

77-001759 Silvert, W. THE ECONOMICS OF OVER-FISHING. Trans. Am. Fish. Soc. 106 (2): 121-130. Mar. 1977. SFA 22(3)
[Inst. Environ. Stud., Dalhousie Univ., Halifax, NS B3H 4J1, Canada]

77-001760 West Virginia Division of Wildlife Resources TODAY'S PLAN FOR TOMORROW'S WILDLIFE. W. Va. Dep. Nat. Resour. Div. Wildl. Resour. vii + 59p. 1977. SFA 22(3)
[Charleston, WV] A strategic plan for fish and wildlife management for the period 1975-1985.--RS

ADMINISTRATION AND PLANNING

77-001761 FAO of the UN SUMMARY REPORT AND RECOMMENDATIONS OF THE SECOND SESSION OF THE JOINT FAO/IOC PANEL OF EXPERTS ON THE AQUATIC SCIENCES AND FISHERIES INFORMATION SYSTEM (ASFIS). FAO Fish. Rep. No. 186. v + 21p. Nov. 1976. SFA 22(3)
[Rome, Italy]

77-001762 Fisheries Research Board of Canada ANNUAL REPORT, 1976. Dep. Fish. Environ. Fish. Mar. Serv., Ottawa, Canada 15p. 1977. In English and French. SFA 22(3)
[Ottawa K1A 0E6, Canada]

77-001763 Harville, J. P. THE CHALLENGE OF THE NATIONAL PLAN FOR MARINE FISHERIES. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 36-49. July 1975. SFA 22(3)
[Pac. Mar. Fish. Comm., 342 State Office Bldg., 1400 SW 5th Ave, Portland, OR 97201]



SPORT FISHERY ABSTRACTS

77-001764 McNall, W. J. PREPARING NOW FOR FUTURE ANGLERS' FREEDOMS OF CHOICE. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 183-186. July 1975. SFA 22(3)

[N. Mex. Dep. Game Fish, Santa Fe]

77-001765 Miles, E. U.S. FISHERIES MANAGEMENT UNDER EXTENDED JURISDICTION. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 50-54. July 1975. SFA 22(3)

[Univ. Wash., Seattle]

77-001766 Mitchell, B.; Huntley, H. M. AN ANALYSIS OF CRITICISMS OF INTERNATIONAL FISHERY ORGANIZATIONS WITH REFERENCE TO THREE AGENCIES ASSOCIATED WITH THE CANADIAN WEST COAST FISHERY. J. Environ. Manage. (1): 47-73. Jan. 1977. SFA 22(3)

[Dep. Geogr., Univ. Waterloo, Waterloo, ON, Canada] The purpose of this study is to identify weaknesses of international fishery agencies and to explore their implications for management. Based upon a literature review, nine common criticisms of international fishery organization are identified. These criticisms are then examined relative to three international agencies associated with the Canadian west coast fishery: the International North Pacific Fisheries Commission, International Pacific Halibut Commission, and International Pacific Salmon Commission. These organizations vary in terms of structure, target species and management problems. Data were collected during three months in the summer of 1974 by personal interviews. Respondents were selected from various groups within the industry. Specifically, interviews were completed with representatives from the international fishery organizations, national government fishery departments, provincial government agencies, fishermen, processors and external experts. The findings suggest that two types of criticism exist. For one type, consensus exists as to the validity of the criticisms but considerable variation emerges as to whether they have positive or negative impacts upon management. A second type of criticism exists for which it is agreed that not only are the criticisms relevant but that they also have a negative effect on management practices. For either category, however, it is clear that no simple solutions exist. Rather alternatives are available, each having mutually exclusive advantages and disadvantages.--From abstr.

REPORTS OF FISHERY STATIONS, STATES, ETC.

77-001767 California Department of Fish and Game CALIFORNIA COOPERATIVE OCEANIC FISHERIES INVESTIGATIONS. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 188p. May 1976. SFA 22(3)

[Sacramento, CA]

77-001768 FAO of the UN REPORT OF THE SIXTH SESSION OF THE REGIONAL FISHERIES ADVISORY COMMISSION FOR THE SOUTHWEST ATLANTIC. FAO Fish. Rep. No. 159. iii + 62p. May 1975. SFA 22(3)

[Rome, Italy]

77-001769 FAO of the UN YEARBOOK OF FISHERY STATISTICS. CATCHES AND LANDINGS. 1975. Dep. Fish., FAO, Rome, Italy 40 xxii + 417p. 1976. In English, French, and Italian. SFA 22(3)
[Dep. Fish., FAO 00100 Rome, Italy]

77-001770 General Fisheries Council for the Mediterranean REPORT OF THE 13TH SESSION. Gen. Fish. Counc. Mediterr. Sess. Rep. 13 ii + 66p. 1976. SFA 22(3)
[FAO Headquarters, Rome, Italy]

HABITAT ALTERATION

77-001771 Blake, R. F. THE EFFECT OF THE IMPOUNDMENT OF LAKE KAINJI, NIGERIA, ON THE INDIGENOUS SPECIES OF MORMYRID FISHES. Freshwater Biol. 7 (1): 37-42. Feb. 1977. SFA 22(3)

[Univ. Liverpool, Dep. Mar. Biol., Port Erin, Isle of Man, United Kingdom] Changes in the numbers and species composition of mormyrid fishes since the impoundment of the Niger (Lake Kainji) are analysed. An initial decline after impoundment appears to have been reversed and these fish are now increasing. The increase is, however, restricted to a few species only; many forms common in the river are still declining or have disappeared altogether. Marked seasonal variations in abundance are described and possible explanations discussed.

77-001772 Carroll, J. H., Jr.; Ingold, D.; Bradley, M. DISTRIBUTION AND SPECIES DIVERSITY OF SUMMER FISH POPULATIONS IN TWO CHANNELIZED RIVERS IN NORTHEAST TEXAS. Southwest. Nat. 22 (1): 128-134. 1 Mar. 1977. SFA 22(3)
[Corps of Engineers, Tulsa, OK 74102]

77-001773 Funk, J. L.; Robinson, J. W. CHANGES IN THE CHANNEL OF THE LOWER MISSOURI RIVER AND EFFECTS ON FISH AND WILDLIFE. Mo. Dep. Conserv. Aquatic Ser. No. 11. 52p. Nov. 1974. SFA 22(3)
[Mo. Dep. Conserv., Jefferson City]

77-001774 Hammond, D. L.; Mvatt, D. O.; Cupka, D. M. EVALUATION OF MIDWATER STRUCTURES AS A POTENTIAL TOOL IN THE MANAGEMENT OF THE FISHERIES RESOURCES ON SOUTH CAROLINA'S ARTIFICIAL FISHING REEFS. S. C. Mar. Res. Cent. Tech. Rep. Ser. No. 15. iii + 19p. Feb. 1977. SFA 22(3)
[S. Car. Wildl. Mar. Resour. Dep., P.O. Box 12559, Charleston 29412]

77-001775 Hickman, G. D. VALUE OF INSTREAM COVER TO THE FISH POPULATIONS OF MIDDLE FABIUS RIVER, MISSOURI. Mo. Dep. Conserv. Aquatic Ser. No. 14. 7p. Nov. 1975. SFA 22(3)

[Mo. Dep. Conserv., Jefferson City] Fish populations were sampled in the Middle Fabius River at three stations which had an abundance of instream cover for fish and two stations which did not have abundant cover to assess the effects of a proposed "clearing and snagging" project. Sampling stations were near equal in factors other than the presence of cover. The standing crop of each major species of fish was determined for each station and the standing crop of catchable-size fish was estimated. The total fish population in sampling stations without snags was 25 per cent lower than in stations with snags. The

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population of catchable-size fish in stations without snags was 51 per cent lower than in stations with snags. No significant differences in length-weight relationships of six species were detected between fish from stations with and without snags.

77-001776 Raleigh, R. F. THE WESTERN ENERGY/MINERAL SCENARIO. Fisheries (Bull. Am. Fish. Soc.) 2 (1): 2-5, 13. Jan.-Feb. 1977. SFA 22(3)

[U.S. FWS, Post Office, Fort Collins, CO 80521]

77-001777 Rosenberg, R. EFFECTS OF DREDGING OPERATIONS ON ESTUARINE BENTHIC MACROFAUNA. Mar. Pollut. Bull. 8 (5): 102-104. May 1977. SFA 22(3)

[Swedish Water Air Pollut. Res. Lab., P.O. Box 5207, S-402 24, Gothenberg, Sweden] Dredging operations in a Swedish estuary reduced the number and diversity of benthic species. The larval recruitment in the vicinity of the dredged area was strongly affected. An overall increase in concentrations of Hg, Cd, Zn, Cu, Pb and Ni were recorded in benthic fauna. One and a half years after termination of dredging, the benthic community structure was nearly restored and the high concentrations of heavy metals had decreased considerably.

77-001778 Rounsefell, G. A. ECOLOGICAL EFFECTS OF OFFSHORE CONSTRUCTION. J. Mar. Sci. 2 (1): 1-208. 1972. SFA 22(3)

An evaluation of current knowledge of the probable ecological effects of various type of offshore construction reveals slight danger from the majority of construction programs. The greatest dangers lie in the placement of artificial islands within or too closely adjacent to estuaries where they can significantly effect water exchange, and in the proliferation of water cooled nuclear power plants. Perhaps the most pressing need for ultimate human survival is the further development of power from natural forces to replace power from nuclear and fossil fuel sources.

77-001779 Stalnaker, C. B. ABSTRACTION, APPROPRIATION, AND INSTREAM FLOW NEEDS. Fisheries (Bull. Am. Fish. Soc.) 2 (1): 17-19. Jan.-Feb. 1977. SFA 22(3)

[U.S. FWS, Fort Collins, CO 80521]

77-001780 Vittor, B. A. EFFECTS OF CHANNEL DREDGING ON BIOTA OF A SHALLOW ALABAMA ESTUARY. J. Mar. Sci. 2 (3): 111-133. 1974. SFA 22(3)

[Univ. Ala., Mar. Sci. Prog., Dauphin Island]

77-001781 White, D. S.; Hill, F. C.; Haas, K. W. THE FISHES OF GOOSE CREEK, JEFFERSON COUNTY, KENTUCKY: A STREAM UNDER THE INFLUENCE OF URBAN DEVELOPMENT. Trans. Ky. Acad. Sci. 38 (1-2): 45-55. Mar. 1977. SFA 22(3)

[Univ. Okla. Biol. Stn., Kingston 73439] Goose Creek is a small, springfed stream beginning to show the influence of urban development along its banks. During the study, 63 species of fishes were collected in Goose Creek and annotations are given for each. Although sedimentation and discharges from sewage treatment plants are beginning to affect the distribution of fishes, the populations were extensive and possibly even enhanced by the additional nutrients that entered the stream during the study period. At present, Goose Creek not only has an assemblage of fishes that inhabit small streams, but

SPORT FISHERY ABSTRACTS

77-001781 CONTINUED

is utilized by many species from the Ohio River as a breeding and foraging ground.

HARVEST, CREEL CENSUS

77-001782 Anonymous. SALMON HARVEST UP. Alaska Fish Tales Game Trails. 10 (1): 1,20. Jan.-Feb. 1977. SFA 22(3)

A report on salmon harvest in Alaska in 1976.--PS

77-001783 Crowe, D. M. ECONOMIC IMPACT OF HUNTING AND FISHING IN WYOMING. Wyo. Wildl. 41 (6): 4-6. June 1977. SFA 22(3)
[Wyo. Game Fish Dep., Cheyenne 820021]

77-001784 Hammond, D. E.; Ager, L. A. A MARK-RECAPTURE STUDY ON LARGEMOUTH BASS USED IN CONJUNCTION WITH A CREEL SURVEY. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 119-125. 1975[1976]. SFA 22(3)

[Fla. Game Fresh Water Fish Comm., Lake Okeechobee Biol. Stn., Okeechobee] A mark-recapture study used in conjunction with a roving creel survey utilizing non-uniform probability sampling was conducted in two 1,000 acre study areas on Lake Okeechobee. In one study area, 472 largemouth bass 216mm and greater total length were tagged and released prior to the creel survey. In the other study area, 201 largemouth bass 241mm and greater total length were tagged and released prior to the creel survey. Of 48 total recaptures from both years, only two fish had moved outside the creel survey area. Both surveys indicated under-utilization of bass less than 356mm total length, and over-exploitation of bass 356mm and greater.

77-001785 Hampton, F. L.; Lackey, R. T. ANALYSIS OF ANGLER PREFERENCES AND FISHERIES MANAGEMENT OBJECTIVES WITH IMPLICATIONS FOR MANAGEMENT. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 310-316. 1975[1976]. SFA 22(3)

[Dep. Fish. Wildl. Sci., VPI & SU, Blacksburg, VA 24061] Fisheries managers have long operated under the assumptions that time spent fishing (angler-days) or pounds or numbers of fish caught (maximum sustained yield) were accurate measures of fisheries output. However, many fisheries managers today advocate development of a multidimensional output measure which would incorporate social, aesthetic, and psychological factors. The present study was undertaken to delineate and determine the relative importance of 10 items affecting the quality of angling as perceived by Virginia fee-fishermen. A self-administered questionnaire employing a modified Likert scale was used to evaluate the 10 quality-related items. A factor analysis was run which resulted in four factors relating to the quality of fee-fishing. The factors were (1) attractiveness of the fishing site, (2) amount of fishing, (3) satisfaction, and (4) improvements needed. The four factors, when combined with the mean importance scores, indicate that the quality of fee-fishing is multidimensional and not dependent solely on catch. A portion of the survey was devoted to determining the relative importance of 9 fisheries management objectives as indicated by fisheries managers employed by the 50 state recreational fisheries management agencies. An analysis of the most important objectives, maximizing sustained yield (pounds) and catch (numbers), and the most important angling factors, revealed that a disparity exists between angler desires and managers' objectives. Some recommendations for eliminating this

SPORT FISHERY ABSTRACTS

77-001785 CONTINUED
difference are given.

77-001786 Hanson, W. D.; Dillard, J. G. CONTRIBUTION OF STRIPED BASS TO THE FISHERY OF LAKE OF THE OZARKS, MISSOURI. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 162-167. 1975[1976]. SFA 22(3)

[Mo. Dep. Conserv., 1110 College Ave., Columbia 65201] Lake of the Ozarks, a 60,000 acre reservoir built in 1931 by the Union Electric Company in west-central Missouri, was chosen for an introduction of striped bass since it offered the best chance for establishing a naturally perpetuating fishery in Missouri. Fingerling striped bass were reared and stocked each year from 1967 to 1974 with the exception of 1972. The effects of these introductions upon the existing fishery were monitored by a creel census conducted from March to November, 1967-1973. Fishing pressure in the two census areas of the lake ranged from 35.5 to 63.7 hours per acre in the Nangua Arm and from 10.4 to 25.9 hours per acre in the Osage Arm. The average number of fishing trips per acre per year was 18.5 for the Nangua Arm and 5.4 for the Osage Arm. Fish harvested and catch rate were estimated and ranged from 42,000 (0.61 fish per hour) to 138,000 (1.11 fish per hour) fishes caught in the Nangua Arm and from 15,600 (0.40 fish per hour) to 164,000 (1.69 fish per hour) fish caught in the Osage Arm. White crappies, white bass, channel catfish, and bluegills made up about 90 percent of the catch from both arms. Striped bass were first observed in the creel in 1971. Most of the 41 stripers reported or observed were taken from the clearest water areas of the lake and from the tailwater. Fishing success, in general, was positively correlated with water clarity; the clearer water provided a better catch. Stocking densities were considered too low to adequately evaluate the introduction of striped bass. Those that were stocked apparently did not adversely affect the harvest of other fishes. The completion of Harry S. Trumar Dam above Lake of the Ozarks will undoubtedly preclude the establishment of a self-perpetuating striped bass fishery since the river characteristics needed for spawning will be permanently altered.

77-001787 Huntsman, G. R.; Dixon, P. L. RECREATIONAL CATCHES OF FOUR SPECIES OF GROUPERS IN THE CAROLINA HEADBOAT FISHERY. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 185-194. 1975[1976], SFA 22(3)

[NMFS, Atl. Estuarine Fish. Cent., Beaufort, NC 28516] A recreational fishery for semitropical reef fishes has developed over the past 12 years off the North Carolina and South Carolina coasts. About 30 headboats fishing from coastal cities transport anglers to the fishing ground daily for a fee. The faster vessels regularly fish selected locations on the edge of the Continental Shelf 40 to 50 miles offshore while the slower ones fish coral patches and rocky outcroppings closer inshore. A large part of the catch is composed of four species of grouper: scamp, *Mycteroperca phenax*; sea, *Mycteroperca microlepis*; speckled hind, *Epinephelus drummondhayi*; and snowy grouper, *Epinephelus niveatus*. Catch and effort statistics indicate that these species can become quickly depleted from fishing sites by continued heavy fishing pressure. Their abundance on fishing sites in the area has generally remained high, however, because vessel captains try to spread fishing effort in order not to deplete any one site. Restocking of depleted sites is slow.

77-001788 Kempinger, J. J. COST OF STOCKED WALLEYES CAUGHT BY ANGLERS IN ESCANABA LAKE. Wis. Dep. Nat. Resour. Res. Rep. 91: 5p. Mar. 1977. SFA 22(3)

[Wis. Dep. Nat. Resour., Madison] Cost of walleyes stocked in Escanaba Lake in Vilas County and return to the angler was evaluated on the basis of 4 stockings between 1954 and 1961. Costs reported include fry production, rearing, and distribution costs, but do not include amortization of the rearing facilities. Results were strongly influenced by the fact that only one successful year class was established. Return to the angler averaged 3.8 percent, was 13.5 percent for the first year, and was less than 1 percent for each of the other three years. Cost per stocked walleye caught by anglers averaged \$1.86, was \$3.67 for the first year, and ranged from \$4.60 to \$76.68 for each of the other three years.

77-001789 Smith, S. I. STANDING CROP, SUCCESS AND HARVEST IN A TROPHY BASS LAKE, LAKE JACKSON, FLORIDA. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 135-141. 1975/1976. SFA 22(3)

[Fla. Game Fresh Water Fish Comm., Eustis 327261] The fish population of Lake Jackson was sampled over a three year period. The standing crop estimate was 97 lbs. 11 oz. per acre with largemouth bass comprising 36.7 percent of this total. Evidence is presented indicating the possibility of an overcrowded bass population. A creel survey, conducted during the last year of the study, documented intense fishing pressure and high harvest in Lake Jackson. Largemouth bass comprised an unusually high proportion of the effort (71.6 percent) and harvest (41.5 percent), with one trophy bass (greater than 8 lbs.) landed for each 13 acres of lake surface.

77-001790 Spigarelli, S. A.; Thommes, M. M. SPORT FISHING AT A THERMAL DISCHARGE INTO LAKE MICHIGAN. J. Great Lakes Res. 2 (1): 99-110. 1976. SFA 22(3)

[Argonne Natl. Lab., Argonne, IL] Sport fishing censuses were conducted during 1972 and 1973 at the Point Beach Nuclear Plant on Lake Michigan (Two Rivers, Wisconsin). The objectives of this study were to describe the fishery at a typical shoreline thermal discharge into the upper Great Lakes and to make comparisons with reference fisheries in unheated areas. Extensive sport fishing at this power plant resulted in a relatively large catch of trout (4 species) and sporadic catches of salmon and non-salmonid species. Species composition of the catch and catch per-unit-effort varied daily and seasonally and generally reflected trends in reference fisheries. A comparison between years showed increased fishing effort, total catch, and proportion of trout in 1973, while success (catch-per-unit-effort) decreased. Despite this heavy fishing pressure, catch-per-unit-effort was generally higher at Point Beach than in reference shoreline fisheries. The economic value of thermal discharge fisheries on Lake Michigan is estimated using available value and expenditure data.

77-001791 Strang, W. A.; Ditton, R. B. THE LAKE MICHIGAN CHARTER FISHING INDUSTRY: A PRODUCT OF LOVE AND TAXES. J. Great Lakes Res. 2 (1): 89-98. 1976. SFA 22(3)

[Grad. Sch. Bus. Admin., Univ. Wis., Madison] Little is known about the Lake Michigan charter fishing industry. This study was conducted to describe Lake Michigan charter fishing boat operators and their customers and to evaluate the industry's financial status and local economic impact. Field work in 1973 revealed 98 charter operators working on Lake Michigan from Wisconsin ports. From a geographically proportionate sample, 48 extensive interviews were completed. The industry generated \$670,000 in sales in 1973. Low average sales and

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77-001791 CONTINUED

profits do not provide financial incentives to entrepreneurs. Financial opportunity, however, appears to have played a minor role in the decision to enter business. Major motivations appear to be tax advantages and life style rewards. A profile of charter customers was developed through a mail survey of a sample of 483 charter customers. Catch data were collected from operators surveyed. Catch varied with the proportion of operator income obtained from charter fishing. Port communities were affected economically by the industry. Applying a community multiplier of 2.16 to the \$1.6 million of direct expenditures yields an economic impact of \$3,456,000 on Wisconsin's Lake Michigan community in 1973. The industry is also important in that it provided fishermen with access to the Great Lakes lake trout and salmon fisheries. Without that access, these fisheries would be largely reserved for the wealthy.

77-001792 Sutherland, D. F. CATCH AND CATCH RATES OF FISHES CAUGHT BY ANGLERS IN THE ST. ANDREW BAY SYSTEM, FLORIDA, AND ADJACENT COASTAL WATERS, 1973. NOAA Tech. Rep. NMFS SSF-70. iii + 9 p. Mar. 1977. SEA 22(3)

NMFS, Southeast Fish. Cent., P.O. Box 4218, Panama City, FL 32401. Anglers were interviewed on four fixed platforms in the St. Andrew Bay system and on charter boats that were fishing in the bay and adjacent coastal waters in 1973. They caught fishes of at least 54 species (not all were identified to species) in 31 families. The majority (58.0 percent) of the fishes that were caught from fixed platforms consisted of pinfish, *Lagodon rhomboides*, (18.2 percent); sea catfish, *Arius felis*, (12.2 percent); spotted seatrout, *Cynoscion nebulosus*, (10.0 percent); blue runner, *Caranx crysos*, (8.8 percent); and crevalle jack, *Caranx hippos*, (8.8 percent). On charter boats, king mackerel, *Scomberomorus cavalla*, comprised the majority of the catches (73.9 percent). The average catch rates varied from 0.0 to 10.7 fish/h among anglers on fixed platforms and from 0.0 to 32.0 fish/h among charter boats. The greatest monthly average catch rates on fixed platforms were 2.2 fish/h in October at Deer Point Dam, 1.8 in October at Bailey Bridge, 1.8 in December at Pathaway Bridge, 2.3 in May at West Jetty, and 10.6 in September on charter boats. On the fixed platforms, the highest average catch rate for all months was 1.4 with squid and the lowest was 0.5 with fiddler crabs. Whole round scads and 00-squid spoons were used for bait by virtually all surveyed charter boats.

REGULATIONS

77-001793 Adasiak, A. LIMITED ENTRY--THE ALASKA EXPERIENCE. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 195-214. July 1975. SEA 22(3)

[Alaska Commercial Fish. Entry Comm., Juneau]

77-001794 Eiserman, F. AN UNEASINESS ON THE OVER EMPHASIS OF FISHING REGULATIONS IN THE MANAGEMENT OF A RECREATIONAL FISHERY. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 176-182. July 1975. SEA 22(3)

[Wyo. Game Fish Dep., Cheyenne]

SPORT FISHERY ABSTRACTS

MARKING AND TAGGING

77-001795 Engelhardt, W. H. RETENTION OF FLUORESCENT PIGMENT MARKS BY TWO STRAINS OF LARGEMOUTH BASS. Trans. Am. Fish. Soc. 106 (1): Jan. 1977. SFA 22(3)

[Dep. Zool., Okla. State Univ., Stillwater 74074]

77-001796 Heugel, B. R.; Joswiak, G. R.; Moore, W. S. SUBCUTANEOUS DIAZO FILM TAG FOR SMALL FISHES. Prog. Fish-Cult. 39 (2): 98-99. Apr. 1977. SFA 22(3)

[Dep. Biol., Wayne State Univ., Detroit, MI 48202]

77-001797 Winters, G. H. ESTIMATES OF TAG EXTRUSION AND INITIAL TAGGING MORTALITY IN ATLANTIC HERRING (*CLUPEA HARENGUS HARENGUS*) RELEASED WITH ABDOMINALLY INSERTED MAGNETIC TAGS. NOAA Fish. Bull. 34 (3): 354-359. Mar. 1977. In English with French summ. SFA 22(3)
[Fish. Mar. Serv., Biol. Stn., St. John's, NF A1C 1A1, Canada]

STOCKING AND INTRODUCTIONS

77-001798 Belusz, L. C. THE USE OF ISOLATION COVES IN ASSESSING MUSKELLUNGE STOCKING MORTALITY. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 251-253. 1975[1976]. SFA 22(3)

[Mo. Dep. Conserv., P. Sedalia 65301] A method to determine short term muskellunge stocking mortality by using isolation coves is discussed. The method allows for free movement and feeding of muskellunge while restricting lakeward movement. Mortality of muskellunge was readily determined with the use of SCUBA. Stocking mortality due to stress of handling and transportation was considered minimal. Observations indicate that future stocking of muskellunge be made in areas of extensive weed cover.

77-001799 Forshade, A. COST/BENEFIT ANALYSIS OF A CATCHABLE RAINBOW TROUT FISHERY IN TEXAS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 293-300. 1975[1976]. SFA 22(3)

[Texas Parks Wildlife Dep., Austin] An evaluation of stocking catchable rainbow trout, *Salmo gairdneri*, in a section of the Brazos River was made in 1972-73 to determine if trout stocking is an economically and recreationally justifiable fishery management technique in Texas. A creel survey to measure fishing pressure and harvest, gross annual expenditures, and net economic value of the fishery was made before and after trout introduction. Benefits, in terms of increased harvest and utilization, were found to be substantially higher than the cost of stocking catchable rainbow trout.



SPORT FISHERY ABSTRACTS

77-001800 May, B. E.; Pepworth, D. K.; Starostka, V.; Gloss, S. P. IMPACT OF A THREADFIN SHAD INTRODUCTION ON FOOD HABITS AND GROWTH OF RAINBOW TROUT IN LAKE POWELL, UTAH. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 228-248. July 1975. SFA 22(3)

[Utah Div. Wildl. Resour., Cedar City 84720] Introduction and establishment of threadfin shad in Lake Powell as a new forage base markedly influenced diets and significantly increased growth of rainbow trout. Average lengths of trout sampled increased from 360 mm, prior to introduction of threadfin shad, to 470 mm after shad became established. The most dramatic increase in rainbow trout growth was exhibited in weight increases following shad introduction and availability. Threadfin shad became an important food replacing many forage items prominent in trout diets prior to shad utilization. Rainbow trout seasonal and size group selectivity for certain items were drastically reduced subsequent to shad availability. Rainbow trout, in Lake Powell, responded favorably to the new abundant source of food and the increased growth subsequent to shad utilization produced a highly satisfactory fish for sport fishing purposes.--From auth.

77-001801 Mullan, J. W. CONDITION (K) AS INDICATIVE OF NON-SUITABILITY OF SNAKE RIVER CUTTHROAT TROUT IN THE MANAGEMENT OF HIGH GRADIENT, LOW DIVERSITY STREAMS. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 267-274. July 1975. SFA 22(3)

[U.S. FWS, Vernal, UT] Comparison of condition factors between the trout species examined suggest that the Snake River cutthroat's poor showing is not wholly attributable to hatchery background or principles of competition, but that aspects of the species ecological and behavioral differences play a role as well. From the practical point of view, rainbow trout offer a better management option in these high gradient streams with low lineal and cross sectional diversity. Stocking in other distinctive stream habitat, such as Flaming Gorge Reservoir tailwater, where they are reported doing well should be documented so that the options available with this species can be more fully realized.--From auth.

77-001802 Velarde, P.; Hazzard, Y. A NEW HOME FOR AN OLD NATIVE. Colo. Outdoors 26 (2): 17-19. Mar.-Apr. 1977. SFA 22(3)

[Colo. Div. Wildl., Monte Vista] Discusses efforts to increase populations of the Rio Grande cutthroat trout in Colorado.--RS

77-001803 Wigfall, M.; Parkuloo, J. M. A PRELIMINARY REPORT ON THE ABUNDANCE AND BIOLOGY OF STOCKED STRIPED BASS IN THE CHOCTAWHATCHEE RIVER SYSTEM, FLORIDA. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 152-161. 1975[1976]. SFA 22(3)

[U.S. FWS, Fish. Serv. Coast. Ecosyst. Act., Panama City, FL] Striped bass were stocked in the Choctawhatchee River System from 1968-1975. Abundance results are reported for seines, trawls, and gill nets. Striped bass accounted for 1.75 percent and 1.44 percent of the number and weight, respectively, of all fishes caught in 36 months of gill netting. The mean catch of striped bass in trawls was .070 fish per tow and in seines .004 fish per haul. Condition, growth rates, and stomach contents were similar to those reported in other studies.

FISHING GEAR AND TECHNIQUES

77-001804 Amos, S. C. PAIR BOTTOM TRAWLING IN VICTORIA. Victoria Fish. Wildl. Pap. No. 9. 28p. Sept. 1976. SFA 22(3)

[Arthur Rylah Inst. environ. Res., Brown St., Heidelberg, Victoria, 3084, Australia] Two vessels fished for 277.4 h, making 130 hauls for a total catch weight of 30.1 tonnes. The vessels trawled on offshore grounds close to the edge of the continental shelf for species such as morwong and inshore, close to the eastern shore Wilsons Promontory, for school whiting. They also attempted to locate other suitable trawl grounds in Bass Strait. An overall catch rate of 108 kg/h fishing was achieved; this did not compare favourably with catch rates achieved previously by single boat trawlers working in similar areas. The catch rates (kg/h fishing) for individual species were: morwong, 38; hake, 4; snoek, 6; school whiting, 26; shark, 6; sand flathead, 5; and mixed species group 23. The catch rate for school whiting and the proximity of the school whiting fishing grounds to the home port seemed to indicate this as the best prospect for a commercial fishery. The total income from the sale of 30.1 tonnes of fish was \$5487 with school whiting, shark, and hake providing the best price at the Victorian fish market. Although the vessels completed an acceptable fishing effort in the allotted time, their catch rates were low and further work is required to investigate ways of improving these catch rates.

77-001805 Amos, S. C. PAIR MID-WATER TRAWLING IN VICTORIA. Victoria Fish. Wildl. Pap. No. 11. 28p. Dec. 1976. SFA 22(3)

[Arthur Rylah Inst. Environ. Res., Brown St., Heidelberg, Victoria 3084, Australia] Pair mid-water trawling in Victorian coastal and Bass Strait waters was unsuccessful and is therefore considered uneconomical at present.--From abstr.

77-001806 Austin, C. B. INCORPORATING SOAK TIME INTO MEASUREMENT OF FISHING EFFORT IN TRAP FISHERIES. NOAA Fish. Bull. 75 (1): 213-218. Jan. 1977. SFA 22(3)

[Rosentiel/Sch. Mar. Atmos. Sci., Univ. Miami, FL 33149] When the soak time is variable in trap fisheries, trap days may not be an accurate index of fishing effort. Furthermore, there is evidence that as the exploitable stock declines the profit-maximizing soak time declines, which can result in a measured catch per trap day that will not reflect the declining relative abundance. It is possible to adjust trap days or catch per trap day according to the soak time to more accurately reflect fishing effort (catch per unit of effort). The calibration of this adjustment requires data on the relationship between the catch and soak time. It is recommended that in the future soak time be documented to facilitate this calibration.--Concl.

77-001807 Downhower, J. P.; Brown, L. A SAMPLING TECHNIQUE FOR BENTHIC FISH POPULATIONS. Copeia 1977 (2): 403-406. 25 May 1977. SFA 22(3)

[Dep. Zool., Ohio State Univ., Columbus 43210]

77-001808 Fujiishi, A.; Tariguchi, T. STUDIES ON SAVING GEAR FOR TRAWL FISHERY--I. MODEL EXPERIMENTS OF A TRAWL NET WITH "BOTTOM CURTAIN". Bull. Jpn. Soc. Sci. Fish. 43 (2): 173-179. Feb. 1977. SFA 22(3)

[Shimonoseki Univ. Fish., Yoshiri, Shimonoseki, Japan] Study on saving gear for the trawl fishery will play an important role in saving immature fish. Model experiments were conducted with the intent to improve and develop a new trawl net with a bottom curtain. Results of the experiment were obtained by means of visual observation and numerous photographs taken through the glass wall of the tank. It was found that the net height increased by means of attaching the bottom curtain, but slack in the lower part of the bottom curtain was also observed.--From abstr.

77-001809 Hoagman, W. J. A FREE-FALLING DROP NET FOR QUANTITATIVELY SAMPLING A WATER COLUMN. Trans. Am. Fish. Soc. 106 (2): 140-145. Mar. 1977. SFA 22(3)

[QFS Proj., P.O. Box 250, Hayes, VA 23072]

77-001810 Jester, D. B. EFFECTS OF COLOR, MESH SIZE, FISHING IN SEASONAL CONCENTRATIONS, AND BAITING ON CATCH RATES OF FISHES IN GILL NETS. Trans. Am. Fish. Soc. 106 (1): 43-56. Jan. 1977. SFA 22(3)

[Dep. Fish. Wildl. Sci., N. Mex. State Univ., Las Cruces 98003]

77-001811 Johnson, T. I.; Pasch, R. W. IMPROVED ROTENONE SAMPLING EQUIPMENT FOR STREAMS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 46-56. 1975/1976]. SFA 22(3)

[Dep. Nat. Resour., Albany, GA] Equipment and a system suitable for sampling fish populations in large streams with rotenone are described. A block net 600 x 25 feet is supported by steel wire rope and adjustable poles. Rotenone is applied by means of a high head centrifugal pump through perforated 1.5 inch discharge hoses. Potassium permanganate is constantly fed into mixing barrels and dumped into the stream below the block net through perforated 2 inch discharge hoses. Successful rotenone sampling has been done with this gear in stream flows up to 3500 cubic feet per second (cfs), and flows up to 5000-6000 cfs can be handled.

77-001812 McGroddy, P. M.; Wyder, R. L. EFFICIENCY OF NETS AND A NEW DEVICE FOR SAMPLING LIVING FISH LARVAE. J. Fish. Res. Board Can. 34 (4): 571-574. Apr. 1977. In English with French summ. SFA 22(3)

[Lauder, Matusky, and Skelly Engineers, Tappan, NY 10983]

77-001813 Pristas, P. J.; Trent, I. COMPARISONS OF CATCHES OF FISHES IN GILL NETS IN RELATION TO WEBBING MATERIAL, TIME OF DAY, AND WATER DEPTH IN ST. ANDREW BAY, FLORIDA. NOAA Fish. Bull. 75 (1): 103-108. Jan. 1977. SFA 22(3)

[NMFS, Southeast Fish. Cent., P.O. Box 4218, Panama City, FL 32401] Monofilament and multifilament gill nets were fished simultaneously in shallow- (0.7-1.1 m), mid- (2.2-2.6 m), and deep- (5.2-5.6 m) water zones for 40 days between 19 September and 29 December 1972, in lower St. Andrew Bay, Fla. Each net was 33.3 m long, had stretched mesh of 9.5 cm, extended from water surface to bottom, and was anchored in position. Nets were checked at sunrise and sunset. Fifty-two species of fishes and one hybrid from 30 families were caught. The 12 most abundant species composed 92 percent of the total number (4,066) caught. Catch comparisons between 1) webbing materials, 2) times of day, and 3) water depths were made from data on catches of the 12 most

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abundant species. Catches in monofilament webbing were greater than those in multifilament webbing for 8 of the 12 species. Greater catches were made at night for all 12 species. Catches of eight species were highest in the deep-water zone, but catches of the remaining four species were highest in the shallow-water zone. Monofilament nets were damaged least, and percent damage decreased as depth zones increased.

77-001814 Robison, R. F. A METHOD FOR FASTING THE LAUNCH AND RECOVERY OF MOUTH-CLOSING MIDWATER TRAWLS. Deep-Sea Res. 24 (3): 301-302. Mar. 1977. SFA 22(3)

[Mar. Sci. Inst., Univ. Calif., Santa Barbara 93106] A method is described to simplify the handling of mouth-closing midwater trawls during launch and recovery operations at sea. The vertical cables of the net mouth are drawn upward to stack the mouth and frame bars into a smaller package.

77-001815 Simpson, D. F.; Reynolds, J. F. USE OF BOAT-MOUNTED ELECTROFISHING GEAR BY FISHERY BIOLOGISTS IN THE UNITED STATES. Prog. Fish.-Cult. 39 (2): 88-89. Apr. 1977. SFA 22(3)
[Coop. Fish. Res. Unit, Univ. Mo., Columbia 65201]

77-001816 Taber, R. F. SOME RECENT EXAMPLES OF FISHING GEAR TECHNOLOGY DEVELOPMENT OR TRANSFER IN NEW ENGLAND. Mar. Fish. Rev. 39 (2): 24-25. Feb. 1977. SFA 22(3)
[Univ. P. I. Mar. Advisory Serv., Kingston, 02881]

77-001817 Trent, L.; Pristas, P. J. SELECTIVITY OF GILL NETS ON ESTUARINE AND COASTAL FISHES FROM ST. ANDREW BAY, FLORIDA. NOAA Fish. Bull. 75 (1): 185-198. Jan. 1977. SFA 22(3)

[NMFS, Southeast. Fish. Cent., P.O. Box 4218, Panama City, FL 32401] Eleven gill nets, each of a different mesh size, were fished 126 days from 4 April to 29 December 1973 in St. Andrew Bay, Fla. Of the estuarine and coastal fishes that were caught, 22 were in numbers sufficient to evaluate the relation between length of fish and mesh size. Mean length increased with an increase in mesh size for 20 species. Ten species--gulf menhaden, spot, sea catfish, pinfish, Atlantic croaker, blue runner, pigfish, bluefish, Spanish mackerel, yellow menhaden--were caught in sufficient numbers to apply and evaluate the normal probability model to define gill net selectivity. One or more of the three assumptions--normality of selectivity curve, linearity of mean length-mesh size relation, and constancy of standard deviation between mesh sizes--inherent in the model was violated by the data for each species to which the model was applied except Atlantic croaker and blue runner. Useful information was provided, however, in relation to evaluating mesh-size regulations and for determining mesh sizes for increasing capture efficiencies in gill net fisheries.--From abstr.

77-001818 Wiley, R. W.; Dufek, D. J.; McKnight, R. G. PRELIMINARY EVALUATION OF SODIUM CYANIDE (CYANORBIT) USED IN SAMPLING FISH POPULATIONS IN THE GREEN AND BLACKS FORK RIVERS. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 249-254. July 1975. SFA 22(3)
[Wyo. Game Fish Dep., Green River]

FERTILIZATION OF WATER AND SOIL

77-001819 Pamatmat, M. M. ALKALINITY, HARDNESS, AND PRODUCTIVITY OF LIMED PONDS. J. Mar. Sci. 2 (3): 95-110. 1974. SFA 22(3)

[Agric. Exp. Stn., Auburn Univ., Auburn, AL 36830] The application of 1120 kg of basic slag per ha and 2240 kg of limestone per ha raised the concentrations of calcium, magnesium, carbonates, and bicarbonates, depressed carbon dioxide tension, and elevated pH, but significant treatment effects in the photic zone were sometimes masked by the diel effects of photosynthesis and respiration. In deeper waters below the photic zone, basic slag and limestone clearly elevated pH and concentrations of carbonate and bicarbonate, and initially depressed free carbon dioxide. Limestone and basic slag had dissimilar effects. Neither treatment raised total hardness to the level of hard waters; their only significant effect on pond bottom soil was a slight increase in pH. The biomass of seston and benthos and bluegill production were unaffected by liming. During 6.5 months, the experimental ponds produced 140 to 290 kg of bluegills per ha.

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

77-001820 Griffith, J. S.; Tomljanovich, D. A. SUSCEPTIBILITY OF THREADFIN SHAD TO IMPINGEMENT. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 223-234. 1975[1976]. SFA 22(3)

[Environ. Sci. Div., Oak Ridge Natl. Lab., Oak Ridge, TN] Threadfin shad impingement at 13 Tennessee Valley Authority electric generating plants from August 1974 through July 1975 was analyzed to assess mortality resulting from low water temperature. Concurrent laboratory experiments were conducted to evaluate the ability of cold-stressed threadfin shad to avoid impingement. Temperatures of 12°C stressed fish in the laboratory, while those below 8°C caused high impingement mortality. At 5 of 12 fossil-fuel plants, 90 percent or more of the annual threadfin impingement occurred when water temperatures were below 10°C. At four plants, impingement was not related to low temperatures. Impingement at the Browns Ferry Nuclear Plant generally coincided with low water temperatures, but individual peaks were not consistently associated with cold shocks.

MATHEMATICS, STATISTICAL METHODS AND MODELING

77-001821 Dupont, W. D. A STOCHASTIC METHOD FOR ESTIMATING ANIMAL ABUNDANCE FROM CATCH-EFFORT DATA. Ph.D. dissertation, Johns Hopkins Univ. 266 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(10), 1977. SFA 22(3)

77-001822 Eberhardt, L. L. RELATIONSHIP BETWEEN TWO STOCK-RECRUITMENT CURVES. J. Fish. Res. Board Can. 34 (3): 425-428. Mar. 1977. In English with French summ. SFA 22(3)

[Pac. Northwest Lab., Battelle Mem. Inst., Richland, WA 99352]

SPORT FISHERY ABSTRACTS

77-001823 Kaesler, R. L.; Herricks, E. E. ANALYSIS OF DATA FROM BIOLOGICAL SURVEYS OF STREAMS: DIVERSITY AND SAMPLE SIZE. Water Resour. Bull. 13 (1): 125-135. Feb. 1977. SFA 22(3)
[Dep. Geol., Univ. Kans., Lawrence 66045]

77-001824 Schnute, J. IMPROVED ESTIMATES FROM THE SCHAEFFER PRODUCTION MODEL: THEORETICAL CONSIDERATIONS. J. Fish. Res. Board Can. 34 (5): 583-603. May 1977. In English with French summ. SFA 22(3)
[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC V9R 5K6, Canada]

LAKE MANAGEMENT & RESEARCH

77-001825 Bayley, P. B. CHANGES IN SPECIES COMPOSITIONS OF THE YIELDS AND CATCH PER EFFORT DURING THE DEVELOPMENT OF THE FISHERY AT LAKE TURKANA, KENYA. Arch. Hydrobiol. 79 (1): 111-132. Jan. 1977. SFA 22(3)

The paper explains the compilation of data on yields, species compositions, fishing effort and catch per effort of the commercial fishery from 1962 to 1975. Effects of mesh size changes in the predominantly gillnet fishery are discussed in terms of species selectivity as measured from experimental gillnets. Comparisons of experimental gillnet catches between 1963 and 1973 are made for key species. It is concluded, that the fishery is unstable with respect to major commercial species, and that this is due not only to changes in fishing gear, but is also attributable to hydrological changes in the long term, and local rainfall altering the littoral vegetation in the short term.

77-001826 Lamarra, V. A. EXPERIMENTAL STUDIES OF THE EFFECT OF CARP (/CYPRINUS CARPIO/ L.) ON THE CHEMISTRY AND BIOLOGY OF LAKES. Ph.D. dissertation, Univ. Minn. 326 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(6), 1976. SFA 22(3)

The stocking of the benthophagous fish, /Cyprinus carpio/ in six enclosures in both Kuska Pond and Sunfish Lake produced increases in chlorophyll /a/, net community primary production and community respiration. The experiments indicated that nutrient regeneration by digestive activities was the cause. In Kuska Pond, 7 days after stocking 200 kg/ha carp, the chlorophyll /a/ increased 41 ug/l above the control. Net primary production was 3.35 mg C/l/day higher than the control at the time while the total phosphorus was 27 ug/l higher. Similar results were obtained in Sunfish Lake. Large scale stocking experiments were conducted in Williams Pond, East Pond and West Pond. A hyperbolic relationship was found between phosphorus loading rate (mgP/m²/day) and sediment phosphorus level (mgP/g dry sediment) in the stocked ponds. Phosphorus regeneration was shown to be substantially greater than some natural sources and comparable to those of urban storm drainage. The level of .2-.35 gP/m²/year internal phosphorus loading by a 200 kg/ha carp density was found to be extensive enough to cause a potentially serious level of eutrophication.--From abstr.

SPORT FISHERY ABSTRACTS

77-001827 McCarraher, D. B. NEBRASKA'S SANDHILLS LAKES. Nebr. Game Parks Comm., Lincoln 67p. 1977. SFA 22(3)
[Nebr. Game Parks Comm., P.O. Box 30370, Lincoln 68503]

77-001828 McKnight, T. C.; Serns, S. L. GROWTH AND HARVEST OF COHO SALMON IN STORMY LAKE, WISCONSIN. Prog. Fish-Cult. 39 (2): 79-85. Apr. 1977. SFA 22(3)
[Wis. Dep. Nat. Resour., Rhineland 545011]

77-001829 Morry, C. J.; Cole, L. J. LIMNOLOGY AND FISH POPULATIONS OF RED INDIAN LAKE, A MULTI-USE RESERVOIR. Environ. Can. Fish. Mar. Serv. Tech. Rep. no. 691. xiii + 109p. 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Newfoundland Biol. Stn., St. John's, NF, Canada] A limnological survey, centering on fish populations, was conducted on Red Indian Lake in the summer of 1974. Physical parameters, as previously recorded, were verified and chemical parameters, including heavy metal concentrations, were observed in over 100 areas. Biological aspects of the project included benthos and plankton sampling and a rigorous gillnetting program aimed at giving a good representative sampling of fish populations throughout the lake. A 96-hour /in situ/ bioassay using local brook trout and ouananiche as subjects was conducted in Buchans Brook to observe critical lethality due to tailings pond run-off. No direct bio-physical hazards could be attributed, as a result of this bio-assay nor the survey in general, to either of the two primary industrial users of Red Indian Lake. Low productivity may in part be due to unstable shoreline conditions resulting from severe fluctuations of water levels.

77-001830 Turner, J. L. SOME EFFECT OF DEMERSAL TRAWLING IN LAKE MALAWI (LAKE NYASA) FROM 1968 TO 1974. J. Fish Biol. 10 (3): 261-271. Mar. 1977. SFA 22(3)

[Fish. Resour. Environ. Div., FAO/UN Rome, Italy] Exploratory trawl data were used to define demersal fish stocks of Lake Malawi in terms of abundance by depth and area. The mean weight of the catch generally declined with increasing depth. A comparison of initial standing stock estimates and the yield from a commercial fishery over a 7 year period suggests a potential yield of less than half of the initial stock. Over 160 species of fish have been identified in the trawl catch of which over 80 percent by weight were cichlids. Some of the commonest species of cichlids are listed. The composition of the catch in the heavily exploited southern end of the lake has changed from one dominated by large species of /Haplochromis/ sp. and /Lethrinops/ sp. to one dominated by smaller species.

RIVER AND STREAM MANAGEMENT & RESEARCH

77-001831 Bjornn, T. C. THE ST. JOE RIVER CUTTHROAT FISHERY--A CASE HISTORY OF ANGLEP PREFERENCE. Proc. Annu. Conf. West. Assoc. State Game Fish Comm. 55: 187-194. July 1975. SFA 22(3)

[Idaho Coop. Fish. Res. Unit., Univ. Idaho, Moscow 83843] We concluded from our studies of stock status that the abundance of cutthroat trout in the St. Joe River was being reduced in abundance through overexploitation. Anglers, when presented the alternatives and trade-offs associated with those alternatives, chose to preserve the cutthroat trout population. Special regulations designed to reduce the mortality rate in the cutthroat population have succeeded in

77-001831 CONTINUED

increasing the abundance and fishing success. Angler support of the special regulations has been enthusiastic even though they were unable to keep most of the fish they caught. We do not expect recovery of the population to full abundance until the late 1970's when off-spring of fish saved in 1971-72 have had a chance to spawn and contribute to the population. Initially we were unsure if the proposed regulations would reduce the mortality sufficiently to allow the population to recover. We feared that hooking mortality alone might be more than the population could withstand. So far at least, the mortality associated with catching and releasing cutthroat trout has not been excessive. Once the population has fully recovered we anticipate that anglers will want to examine the options of retaining the present regulations or liberalizing the regulations to allow anglers to keep more fish.--Concl.

77-001832 Chasan, D. J. HANDS ACROSS THE BORDER. SALMON OF THE FRASER. Pac. Search 11 (6): 10-12. Apr. 1977. SFA 22(3)

[Pacific Search, 715 Harrison St., Seattle, WA 98109] A popularly written paper on salmon management in the Fraser River.--RS

77-001833 Kalnicky, R. A. RECREATIONAL USE OF SMALL STREAMS IN WISCONSIN. Wis. Dep. Nat. Resour. Tech. Bull. No. 95. 20p. 1976. SFA 22(3)

[Water Qual. Plan. Sect., Dep. Nat. Resour., Madison, WI]

77-001834 Ryck, F., Jr. THE EFFECT OF SCOURING FLOODS ON THE BENTHOS OF BIG BUFFALO CREEK, MISSOURI. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 36-45. 1975[1976]. SFA 22(3)

[Mo. Dep. Conserv., Fish Wildl. Res. Cent., Columbia 65201] The effects of scouring floods on the diversity and density of the riffle benthic macroinvertebrate community of Big Buffalo Creek, an unpolluted Missouri Ozark stream, were evaluated from December, 1968 through December, 1969. A modified Hess sampler was used to collect the invertebrate samples. Flash floods that scoured stream substrates had little effect on water quality assessments, although they did cause the temporary dislocation and dispersal of riffle benthic macroinvertebrates. The density and structure of the community were essentially identical to pre-flood conditions 1 month after floods. Diversity index values for samples collected 8 days after a flood were near normal. Apparently, riffle invertebrates were not dispersed over great distances and were therefore able to rapidly repopulate scoured areas. At the end of the study, after seven severe floods, the density, diversity, and species composition of the macroinvertebrate fauna were nearly identical to values observed at the start of the study.

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT

77-001835 Hooper, G. B.; Reeves, W. C. SURVEY OF SUCCESS AND OWNER MANAGEMENT OF NORTH ALABAMA PONDS ONE ACRE AND LESS IN SIZE. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 260-264. 1975[1976]. SFA 22(3)

[Ala. Dep. Conserv. Nat. Resour., Fish. Sect., Decatur 35601] To determine the extent of pond owner management and the condition of balance of the fish population during the first 2 years of fishing in small ponds, 40 ponds were randomly selected for study from 150 ponds 1.0 acre or less in size stocked in the 1971-72 stocking season. Only

SPORT FISHERY ABSTRACTS

77-001835 CONTINUED

five ponds contained balanced fish populations both study years. Primary factors affecting fish population balance were fertilization, livestock utilization, competitive species, severe water level reduction or complete loss of water, and fish kills. Proper pond management was not practiced by most pond owners in the study.

77-001836 Powell, D. H. CHANNEL CATFISH AS AN ADDITIONAL SPORT FISH IN ALABAMA'S STATE-OWNED AND MANAGED PUBLIC FISHING LAKES. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 265-272. 1975[1976]. SFA 22(3)

[Ala. Dep. Conserv. Nat. Resour., Fish. Sect., Montgomery] Channel catfish were stocked in 16 Alabama state-owned and managed public fishing lakes in an effort to create an additional sport fishery. The catfish harvest was generally low the first year after stocking with 100 catfish fingerlings per acre in an established bass-bluegill-redear population. The harvest increased during the second year. The catfish harvest was 54.4 pounds per acre after the first year of fishing in a 100-acre public fishing lake in Alabama which was initially stocked with 100 channel catfish fingerlings per acre in addition to the normal stocking rate of bass, bluegill, and redear. White catfish did not appear to contribute as much to the overall catch as channel catfish under the conditions studied. Channel catfish were well received by the fishing public and contributed significantly to the overall catch in Alabama's public fishing lakes.

LARGE IMPOUNDMENT MANAGEMENT & RESEARCH

77-001837 Adeniji, H. A. SOME ASPECTS OF THE LIMNOLOGY AND THE FISHERY DEVELOPMENT OF KAINJI LAKE, NIGERIA. Arch. Hydrobiol. 75 (2): 253-262. Mar. 1975. SFA 22(3)

[New Bussa, Nigeria] This paper describes how the transparency of the lake water, its thermal structure and the dissolved oxygen concentration affect the plankton and the fish in Kainji lake. The results show that these factors have temporary adverse effects but long term benefits.

77-001838 Blake, B. P. LAKE KAINJI, NIGERIA; A SUMMARY OF THE CHANGES WITHIN THE FISH POPULATION SINCE THE IMPOUNDMENT OF THE NIGER IN 1968. Hydrobiologia 53 (2): 131-137. 4 Apr. 1977. SFA 22(3)

[Dep. Zool., Univ. Reading, England] The relative composition of the major fish families in Lake Kainji between 1974 and 1975 is analysed and compared with pre- and post-impoundment data collected by previous workers. Trends in the fishery are assessed, and it is concluded that the cichlids, particularly *Sarotherodon* (= *Tilapia*) *galilaeus*/ *Artemis*, are becoming the dominant commercially valuable fish. No evidence was found of a significant recovery in the formerly abundant citharinids. The value of the sampling technique is discussed and criticised in relation to under-assessment of certain species, notably *S. galilaeus*. The Schilbeidae were found to be one of the most numerous families in the lake but are commercially under-exploited.

77-001839 Konstantinov, A. S.; Nikol'skiy, G. B.; Poddubnyy, A. G.; Romanenko, V. I.; Stroganov, N. S.; Yakavleva, A. N. INCREASED FISH PRODUCTION OF THE VOLGA RESERVOIRS UNDER CONDITIONS OF MULTIPLE-USE OF WATER RESOURCES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 16 (2): 204-216. 1976. SFA 22(3)

[USSR Acad. Sci., Moscow, USSR] Problems of "productivity" and "clean water" must be considered as two functions of the same ecosystem. The level of the primary and secondary production of the Volga reservoirs, the natural reproduction of fish, fish productivity and ways of increasing it under multiple-use management of water resources are assessed. The interaction of pollution, eutrophication and the development of thermal power is noted and man's approach to these phenomena assessed.

77-001840 Man, H. S. H.; Hockkiss, I. J. STUDIES ON THE ICHTHYO-FAUNA IN PLOVER COVE RESERVOIR, HONG KONG: I. SEQUENCE OF FISH POPULATION CHANGES. J. Fish Biol. 10 (5): 493-503. May 1977. SFA 22(3)

[Dep. Biol., Univ. Hong Kong, Hong Kong] Gill-net surveys were made weekly from May 1971 to April 1974 in Plover Cove Reservoir, Hong Kong and the results analysed to determine the fish species composition in the reservoir, the seasonal fluctuations of catches and the length frequency distribution of some major species. Over 20 species were represented in the fish fauna including almost all the naturally occurring species as well as the stocked species. Of the twenty species, some were collected regularly in gill-net samples while others occurred rarely. *Sarotherodon (Tilapia) mossambicus* (Peters) was the dominant species and contributed the main bulk of the catch. This species also showed distinct age groups in the reservoir and modal changes occurred seasonally. Thus, among the fish species studied only *S. mossambicus* showed a steady and progressive increase in abundance in the reservoir and the full development of this fish population with its wide range of feeding habits should be beneficial.

77-001841 Petr, T. ON SOME FACTORS ASSOCIATED WITH THE INITIAL HIGH FISH CATCHES IN NEW AFRICAN MAN-MADE LAKES. Arch. Hydrobiol. 75 (1): 32-49. Feb. 1975. In English with German summ. SFA 22(3)

[Dep. Zool., Clayton, Australia] The high fish catches in new African tropical and subtropical impoundments which filled over several years, seem to be related mainly to two factors: the annual formation of floodplains during the gradual rising of water, and formation of aufwuchs on submerged terrestrial vegetation. The introduction of fish has considerably improved commercial catches only in a small impoundment. In older impoundments, the demersal and therefore unexploited fish seem to represent a considerable part of the total fish stock. Dissolved solids, conductivity, transparency of water, and dissolved oxygen content in deep water are also discussed in relation to fish commercial landings.

77-001842 Suraswadi, P. NEWLY COVERED GRASS AS A HABITAT FOR FISH IN BUNG BORAPED, THAILAND. Ph. D. dissertation, Univ. Manitoba 1976. From Diss. Abstr. Int. B Sci. Eng. 37(11), 1977. SFA 22(3)

The characteristics of the grassy habitat, weed covered habitat and open water habitat are described in relation to succession stages. Fish fauna, Stomach contents, benthos, vegetation and associated fauna, water and sediment were determined. The effect of continuous water cover on grass-covered habitat was evaluated, in the attempt to imitate the early succession stage after draining and refilling. Information about the mechanisms involved in the nutrient cycle and the effects of water level variations on the food chain were obtained.

77-001842 CONTINUED

The interrelationship between flora and fauna, especially the advantage of grasses compared to floating weeds for locally important fish species, was studied. This information will be used to improve management and increase fish production in Bung Boraped and other reservoirs of Thailand. Bung Boraped could be maintained at a highly productive level if much of the natural community were periodically destroyed before it reached the maturation stage. Water level manipulation in summer appears to be appropriate for maximizing fish production. By this process the grass-covered habitat, which is most favourable for fish production, would be re-established.--From abstr.

77-001843 Triplett, J. B. SEASONAL DISTRIBUTION AND SUCCESSIONAL TRENDS OF FISH IN A NEW COOLING RESERVOIR. Ph.D. dissertation, Univ. Kans. 153 p. 1976. From Diss. Abstr. Int. B. Sci. Eng. 37(8), 1977. SFA 22(3)

The fish populations in La Cygne Lake, a 1052 hectare reservoir in eastern Kansas, were studied from November 1971 through October 1974. The reservoir, impounded in 1970, was constructed as a cooling pond for an 840 megawatt power plant. Three locations in the lake were sampled monthly by overnight sets of modified fyke traps in order to characterize changes in the fish populations as the reservoir aged and the power plant began operation. Characteristic of new impoundments, large populations of fish developed during the first two years (1970 and 1971) of impoundment. Severe competition for resources resulted in poor growth of those populations and cropping of the young-of-year in 1972 and 1973. Attrition of the dominant 1970 and 1971 year-classes reduced competition and resulted in increased growth and production during 1974. The 1971 year-class of white crappie (*Pomoxis annularis*), dominated the fish populations and maintained a competitive advantage by opportunistically partitioning the resources among its adult members. The initiation of power plant operation in 1973 resulted in a nearly continuous congregation of fish in the outfall area. Large piscivores dominated the area in the winter and smaller fish were prevalent in the summer.

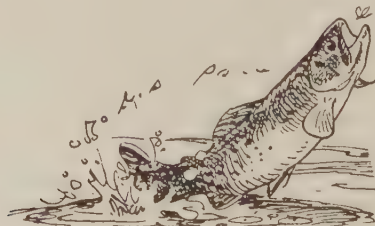
77-001844 Van Velson, R. THE RAINBOW TROUT IN THE NORTH PLATTE VALLEY. Nebr. Game Parks Comm., Lincoln 14p. 1977. Available from Nebr. Game Parks Comm., Box 30370, Lincoln 68503. SFA 22(3)

An attractively illustrated report on the life history and management of the rainbow trout in Lake McConaughy, Nebraska.--RS

ESTUARY MANAGEMENT & RESEARCH

77-001845 Stalter, R. PRESERVATION OF THE WANDO RIVER ESTUARY, SOUTH CAROLINA. Environ. Conserv. 4 (1): 26. 1977. SFA 22(3)

[St. John's Univ., Grand Central and Utopia Parkway, Jamaica, NY 11439]



MARINE MANAGEMENT & RESEARCH

77-001846 Isaacs, J. D. SOME IDEAS AND FRUSTRATIONS ABOUT FISHERY SCIENCE. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 34-43. May 1976. SFA 22(3)

[Scripps Inst. Oceanogr., La Jolla, CA 92093]

77-001847 Larkin, P. A. AN EPITAPH FOR THE CONCEPT OF MAXIMUM SUSTAINED YIELD. Trans. Am. Fish. Soc. 106 (1): 1-11. Jan. 1977. SFA 22(3)

[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

77-001848 Lawrence, W. M. (Moderator) THE CHALLENGE OF EXTENDED FISHERIES JURISDICTION. Proc. Int. Assoc. Fish Wildl. Agencies 66: 73-98. Sept. 1976. SFA 22(3)

A collection of five papers representing various viewpoints on extended fisheries jurisdiction.--RS

77-001849 McHugh, J. L. FISHERIES AND FISHERY RESOURCES OF NEW YORK BIGHT. NOAA Tech. Rep. NMFS Circ. 401. Mar. 1977. SFA 22(3)

[Mar. Sci. Res. Cent., State Univ. N.Y., Stony Brook 11794] The history of total fish and shellfish landings in the two states (New York and New Jersey) that form the landward boundaries of New York Bight is a history of change. Resource after resource has produced maximum landings, then declined. Total landings dropped from about 315,000 metric tons in 1956 to about 23,000 in 1967 and have risen only moderately since that time. The rise and fall of the industrial fisheries, mostly menhaden, was responsible for most of this decline, and this has masked trends in the food fisheries. Altogether about 132 species or groups of species of fishes and invertebrates have been reported as landed in New Jersey or New York since 1880. Fifty of these are discussed and illustrated with figures and tables of landings. Edible finfish species as a group reached peak landings in 1939 and declined fairly steadily to about one-third that level in the 1970s. Molluscan and crustacean shellfish production reached two peaks, in 1950 and 1966, the second considerably higher than the first. This recovery of shellfish landings in 1966 would not have occurred were it not for the rapid development of the surf clam fishery in the 1950s. The timing of the declines makes it clear that foreign fishing was not the cause, for foreign fishing probably could not have affected the fisheries of New York Bight before the mid-1960s. Actually, total catches of resources taken only by domestic fishermen have declined more sharply than total domestic catches of species shared with foreign fleets. Foreign fishing is but a symptom of the troubles of the domestic fisheries, some of which are imagined. The ills of the domestic fisheries are economic and sociopolitical, and they will not yield easily to scientific solutions.

77-001850 Mori, I. RELATIONSHIP BETWEEN CATCH AND FISHING CONDITIONS IN DOMESTICATED YELLOWTAIL FISHING IN NAGASAKI PREF., JAPAN. Bull. Jpn. Soc. Sci. Fish. 43 (3): 271-275. Mar. 1977. In Japanese with English summ. SFA 22(3)

[Nagasaki Pref. Inst. Fish., Nagasaki, Japan]

77-001851 Ness, H. O. OBSERVATIONS ON THE BIRTH OF A SOUTHEASTERN ALASKA FISHERY. Mar. Fish. Rev. 39 (3): 19-22. Mar. 1977. SFA 22(3)
[NMFS, P.O. Box 1668, Juneau, AK 99801]

77-001852 Ness, H. O. THE RECENT DEVELOPMENT OF THE SOUTHEASTERN ALASKA HERRING FISHERY. Mar. Fish. Rev. 39 (3): 15-18. Mar. 1977. SFA 22(3)
[NMFS, P.O. Box 1668, Juneau, AK 99801]

77-001853 Ness, H. O. THE SOUTHEASTERN ALASKA HERRING FISHERY. Mar. Fish. Rev. 39 (3): 10-14. Mar. 1977. SFA 22(3)
[NMFS, P.O. Box 1668, Juneau, AK 99801]

77-001854 Radovich, J. CATCH-PER-UNIT-OF-EFFORT: FACT, FICTION, OR DOGMA. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 31-33. May 1976. SFA 22(3)
[Calif. Dep. Fish Game, Sacramento]

77-001855 Pathjen, W. P. FISHERIES DEVELOPMENT IN NEW ENGLAND--A PERSPECTIVE. Mar. Fish. Rev. 39 (2): 106. Feb. 1977. SFA 22(3)
[NMFS, 14 Elm St., Gloucester, MA 01930]

77-001856 Ronsivalli, L. J. TECHNOLOGY IN FISHERIES DEVELOPMENT. Mar. Fish. Rev. 39 (2): 7-10. Feb. 1977. SFA 22(3)
[NMFS, P.O. Box 61, Gloucester, MA 01930]

77-001857 Rothschild, B. J. FISHERY SCIENCE: FACT, FICTION, AND DOGMA. Calif. Coop. Ocean. Fish. Invest. Rep. 18: 44-45. May 1976. SFA 22(3)
[NMFS, La Jolla, CA 92038]

77-001858 Rounsefell, G. A. POTENTIAL FOOD FROM THE SFA. J. Mar. Sci. 1 (3): 1-85. June 1971. SFA 22(3)

Estimates are made of the maximum sustainable yield of commercial fishery products that reasonably can be expected to be harvested from the world's marine waters. A theoretical estimate based on primary productivity, trophic levels of the organisms harvested, estimated energy losses between trophic levels, and composition of the biomass at each level, yielded 94 million metric tons per year but many variables lack adequate measurement. From existing information on yields of typical areas and the extent of each type of habitat an empirical estimate by summation yielded 93 million metric tons. Although close in total, the two estimates differ widely in species composition. The second method is considered to be more reliable. The third approach attempted extrapolation of historical yields beyond the 58 million metric tons in 1968. This shows that a general rate of increase of 4.3 percent per year has been maintained only by increased fishing pressure and continuous shifts to new species and areas. Most historically fished species are declining in abundance so there is no reason to expect a continued increase in yield. Optimistic estimates of yield, some from two to five times higher, are wholly unwarranted.

77-001859 Shubnikov, D. A. SOME PROBLEMS IN THE STUDY OF COMMERCIAL OCEAN ICHTHYOFAUNA IN LOW LATITUDES. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiolog.) 16 (2): 190-194. 1976. SFA 22(3)
[VNIRO, Moscow, USSR]

77-001860 Stevenson, D. K. DETERMINATION OF MAXIMUM YIELD CONDITIONS FROM LENGTH FREQUENCY DATA FOR A TROPICAL FISH POT FISHERY. Ph.D. dissertation, Univ. R. I. 209p. 1976. From Diss. Abstr. Int. B Sci. Enq. 35(10), 1977. SFA 22(3)

The results did not indicate that a change in mesh size would increase yield for the Puerto Rican pot fishery. Small increases in yield per recruit would be expected for two important species of mesh were increased, but the catch of the smaller, underexploited species would be diminished. A reduction in mesh might increase total biomass yield, but would also increase the capture of smaller and more immature fish, thus reducing recruitment and posing market problems. Improvements in recruitment might be substantial following even small increases in mesh since a significant proportion of the fish presently captured are immature.--From abstr.

77-001861 Treshchev, A. I. ON SOME PROBLEMS OF MARINE FISHERIES SCIENCE. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiolog.) 16 (2): 194-198. 1976. SFA 22(3)
[VNIRO, Moscow, USSR]

77-001862 Uchida, P. N. REEVALUATION OF FISHING EFFORT AND APPARENT ABUNDANCE IN THE HAWAIIAN FISHERY FOR SKIPJACK TUNA, /KATSUWONUS PELAMIS/, 1948-70. NOAA Fish. Bull. 74 (1): 59-69. Jan. 1976. SFA 22(3)

[NMFS, Honolulu Lab., Honolulu, HI 96812] Catch per effective trip, used in 1948-64 as an index of apparent abundance of skipjack tuna, /Katsuwonus pelamis/, in Hawaiian waters, is biased because effective trip, defined as one on which fish were caught, underestimates effort. Catch per day fished, calculated from data collected in 1965-70, is a refined index because effort includes days with or without catches. This paper describes the existence of a linear relationship between catch per effective trip and catch per day fished in 1965-70, and a method of estimating the latter from the former in 1948-64 based on this relationship. Fishing intensity, which was measured by standard effective trips in past studies, is calculated in standard days fished. Changes in catch per standard day fished are not associated with changes in relative fishing intensity. Skipjack tuna abundance in Hawaiian waters, therefore, is fishery independent and is probably influenced by availability and strength of year classes.

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effective trips in past studies, is calculated in standard days fished. Changes in catch per standard day fished are not associated with changes in relative fishing intensity. Skipjack tuna abundance in Hawaiian waters, therefore, is fishery independent and is probably influenced by availability and strength of year classes.

UTILIZATION OF FISHERY PRODUCTS

77-001864 Mendelsohn, J. M.; Connors, T. J.; Callan, J. G. A MACHINE FOR HEADING AND EVISCERATING SMALL FISH. Mar. Fish. Rev. 39 (2): 11-18. Feb. 1977. SFA 22(3)

[NMFS, P.O. Box 61, Gloucester, MA 01930] A commercial fish eviscerating machine has been modified to automatically head, eviscerate, and thoroughly clean whiting, *Merluccius bilinearis*, and similarly shaped species of fish. The unit will process about 60 fish per minute, each weighing between 1/4 and 1-1/2 pounds. The cleaned fish, (butterflied, but with the backbone remaining) can be battered and breaded and deep-fat fried or can be directly processed into minced fish with the use of a meat/bone separator.

MISC. TECHNIQUES AND EQUIPMENT

77-001865 Aggus, L. R.; Rainwater, W. C. ESTIMATING LARGEMOUTH BASS POPULATIONS IN RESERVOIRS FROM CATCHES IN ANGLING TOURNAMENTS. Proc. Annu. Conf. Southeast. Assoc. Game Fish Comm. 29: 106-114. 1975[1976]. SFA 22(3)

[U.S. FWS, South Cent. Reservoir Invest., Fayetteville, AR] We estimated population of largemouth bass (*Micropterus salmoides*) 12 inches long or longer in total length by mark and recapture, using angling tournament catches on 28,200-acre Beaver Lake in 1974, and tournament catches and a supplemental creel census on 45,440-acre Bull Shoals Lake in 1975. Population estimates were 55,450 in Beaver Lake and 30,800 in Bull Shoals Lake. These estimates were in good agreement with those based on mark-recapture samples taken each spring by electrofishing near shore, and were correlated with harvest when applied to the lower reaches of each lake. Lakewide estimates of anglers' catches indicated that the largemouth bass population may have been 2-2.5 times larger than those based on tournament catches in both lakes. Probable sources of bias in these estimates include nonrandomization of marks and recaptures, and an exceptionally high tag return during the 1-month creel census on Bull Shoals Lake. Tournaments during periods of peak springtime fishing afford biologists a potential tool for efficiently estimating black bass populations in large impoundments. Under favorable conditions, tournament catches can provide 20-40 percent of the total fish required for a realistic population estimate.

77-001866 Godin, J.-G.; Dill, P. A.; Sankurathri, M. A COMPARISON OF THE RELATIVE VARIABILITY OF WET AND DRY WEIGHTS OF YOUNG PINK SALMON (*ONCORHYNCHUS GORBUSCHA*/ WATBAUM). Dep. Environ. Fish. Mar. Serv. Tech. Rep. No. 702. iii + 8p. 1977. In English with French summ. SFA 22(3)

[Fish. Mar. Serv., Pac. Biol. Stn., Nanaimo, BC, Canada] Coefficients of variation are presented for wet and dry weights of total fish, yolk and fish tissue of homogeneous samples of young pink salmon at each of three developmental periods. These indicate that wet

SPORT FISHERY ABSTRACTS

77-001866 CONTINUED

weight is relatively less variable than dry weight as a measure of mass when the weighing procedure is standardized.

77-001867 Graves, J. PHOTOGRAPHIC METHOD FOR MEASURING SPACING AND DENSITY WITHIN PELAGIC FISH SCHOOLS AT SEA. NOAA Fish. Bull. 75 (1): 230-234. Jan. 1977. SFA 22(2)

[NMFS, Southwest Fish. Cent., La Jolla, CA 92038]

77-001868 Ishi, T. STUDIES ON COUNTING THE ECHO PATTERN OF INDIVIDUAL FISH BY PATTERN ANALYSIS METHOD--V. ANALYSIS OF THE RELATIONSHIP BETWEEN ECHO PATTERN COUNTS AND FISH DENSITY BY THE SIMULATION METHOD. Bull. Jpn. Soc. Sci. Fish. 43 (2): 151-161. Feb. 1977. SFA 22(3)

[Ocean Res. Inst., Univ. Tokyo, Nakano, Tokyo 164, Japan]

77-001869 Ishii, T. STUDIES ON COUNTING THE ECHO PATTERN OF INDIVIDUAL FISH BY PATTERN ANALYSIS METHOD--IV. DESIGN OF THE ECHO PATTERN MASK. Bull. Jpn. Soc. Sci. Fish. 43 (1): 19-30. Jan. 1977. SFA 22(3)

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77-001870 McElroy, P. T. ACOUSTICS IN MARINE FISHERIES--AN UNDERUSED TOOL. Oceanus 20 (2): 59-66. 1977. SFA 22(3)

[Bolt, Beranek, & Newman, Inc., Cambridge, MA]

77-001871 Vanselow, T. M. FISHERY ENGINEERING ADVANCEMENTS: A 5-YEAR SEFC PROGRESS REPORT. Mar. Fish. Rev. 39 (4): 12-24. Apr. 1977. SFA 22(3)

[NMFS, Bay Saint Louis, MS 39520]

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77-001874 Engett, M. E.; Thorson, L. C. FISHERY PUBLICATION INDEX, 1965-74. NOAA Tech. Rep. NMFS Circ. 400. iii + 220p. Mar. 1977. SFA 22(3)

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77-001875 Fisheries and Environment Canada. SEVENTEENTH SUPPLEMENT TO LIST OF ARTICLES IN THE TRANSLATION SERIES NO. 3626-3925 (WITH AUTHOPS INDEX). Fish. Environ. Can., Fish. Mar. Serv. Transl. Ser. no. 3626-3925. 40p. Jan. 1977. SFA 22(3)
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77-001876 Fuglister, C. B. BIBLIOGRAPHY OF TECHNICAL REPORTS. 1976. Woods Hole Oceanogr. Inst., Woods Hole, Mass. WHOI-76-116. 9p. Jan. 1977. SFA 22(3)
[Woods Hole Oceanogr. Inst., Woods Hole, MA]

WATER USE AND CONSERVATION

77-001877 Doerksen, H. P. WATER ALLOCATION: CONSTRAINTS AND OPPORTUNITIES. Fisheries (Bull. Am. Fish. Soc.) 2 (1): 14-16. Jan.-Feb. 1977. SFA 22(3)
[U.S. FWS, Fort Collins, CO 80521]

77-001878 Hood, F. J. WATERSHED ORGANIZATIONS--IMPACT ON WATER QUALITY MANAGEMENT: AN ANALYSIS OF SELECTED MICHIGAN WATERSHED COUNCILS. Ph.D. dissertation, Mich. State Univ. 301 p. 1976. From Diss. Abstr. Int. B Sci. Eng. 37(9), 1977. SFA 22(3)

Utilizing a case study approach, eight Michigan watershed councils were evaluated to determine the degree to which they could have an effective impact on planning for water quality management. Results from this procedure produced the following conditions and conclusions: 1. Effective watershed water quality management planning from a watershed council perspective is largely limited to advisory, planning and information-education functions. 2. Watershed councils studied varied in their fulfillment of these functions. 3. Most effective watershed councils appear to be those possessing a combination of factors including active involved membership, strong executive committee direction, performance along a problem-service approach, solid, frequent communication and information dissemination to member units, willingness to coordinate their activities, with similar purpose organizations, and full utilization of authority and involvement in activities and functions made possible by the enabling legislation. Problems associated with watershed councils were related largely to statutory weaknesses and deficiencies as well as structural and operational difficulties concerning internal organization, orientation and approach. Recommendations are made for improving the effectiveness of these councils.--From abstr.

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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



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